

GROWTH AND DEVELOPMENT OF THE YOUNG CHILD

GRAND HOTEL
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FOREWORD

THE Merrill-Palmer School began its program in the teaching of child care and training fifteen years ago, and during this time has seen the work in child development and parent education established in many leading educational centers in the United States and Canada. There was a considerable body of knowledge relating to child growth and development previous to this period but for the most part it had been highly specialized, and uncoordinated. The establishment of research centers concerned with the study of the child, in strategic places all over the country, has made possible teaching programs based on scientific findings—both for the guidance of parents and for the training of the younger generation. Because the scientists concerned have become so highly specialized, however, it has been difficult for the teacher or parent to view the child as an organic whole and to achieve an integrated point of view from the subject matter available.

Those concerned with education for home and family life, in secondary schools and colleges, have come to recognize the great possibilities for an understanding not only of child but also of adult behavior afforded through the study of young children. There has been a need, then, not only for integrating subject matter but also for presenting this subject matter in such a way as to teach fundamental principles of mental and physical health.

This volume has been written with the idea of meeting the needs of such instruction through presenting an integrated study of early childhood. The limitations of our present knowledge are only too well understood, but we felt that a text in which facts as known at present were carefully selected and coordinated would be an effective contribution to the development of the fields of education for home and family living and of parent education.

EDNA N. WHITE.

Director, Merrill-Palmer School;
Chairman, National Council of
Parent Education.

PREFACE TO THE SECOND EDITION

THE past fifteen years have witnessed unusual progress in both teaching and research in the field of Child Development—a field which has become the focal point for investigation and study by psychologists, nutritionists, physicians, educators, sociologists, biologists, geneticists, and others. It has been inevitable that each science has regarded Child Development from the viewpoint of its own field with the result that any one person wishing to teach or to be informed in this subject has found it difficult to coordinate the material available from all the fields, and hence to evaluate and organize it for practical use either in teaching or in living. The authors of this volume represent the fields of Parent Education, Physical Growth and Mental Growth. Their close personal and professional association in the Merrill-Palmer School has served to integrate their thinking, and has made possible in the preparation of this book a unified presentation of the subject of Child Development. It is hoped that the book will be of service to students of Child Care and Development and to parents.

Every endeavor has been made to present the most thoroughly substantiated material in Child Development, to put the readers in touch with the knowledge of scientific sources, and to convey the need for the replacement of mere opinion by scientific evidence wherever possible. An attempt has been made to apply scientific material to actual conditions of family life, and to relate the discussions of growth and its determinants to these practical situations.

It is our belief that a clear understanding of the growth and development of children involves a knowledge and appreciation of the part played by physical and social environment. This text concerns itself with the growth and development of young children whose most insistent and ever-present

environment is the family. The authors have therefore devoted considerable space to discussion of the philosophy as well as the practical aspects of family and home life. It is the conviction of the authors that many of the difficulties presented in the growth and development of children are traceable to the maladjustments in family life, and that many of these maladjustments can be prevented if the members of the family have acquired a clear understanding of their part in the home and have achieved a sound philosophy of family life.

The scientific world is recognizing with increasing clearness the fundamental relationship between prenatal care and postnatal growth and development. It is also recognizing the need for teaching such facts as are known, in order that the children of another generation may benefit by them. Knowledge alone will not suffice to induce changes in the growth and development of the child unless that knowledge becomes actually effective in prenatal care of the mother. The material presented on prenatal care endeavors to state such scientific facts as are established and to point the way to their application.

A list of reference books for supplementary reading has been appended to each chapter. A limited number only has been suggested in this connection in order to keep the expenditure of the school or of the student for supplementary reading within reasonable limits. Questions placed at the end of each chapter are designed to help the classroom teacher in stimulating interesting and relevant class discussion.

Class discussions will be immeasurably enriched if the class is given contact with children. Visits to hospital wards, day nurseries, nursery schools, or kindergartens have proved extremely helpful to many teachers of Child Development. Opportunities for work under supervision in day nurseries or nursery schools have been arranged in some courses and have paid excellent dividends in interest and enthusiasm.

The book has been made possible through the interest, the encouragement, and the opportunity for work in this field which has been generously given by Dr. Edna N. White, Director of the Merrill-Palmer School. Her vision of the development of the movement, her understanding of the needs of the field, and her realization of the essentials for a sound

philosophy of family life have guided the thinking and have given inspiration to the authors.

The authors wish to express grateful appreciation to Miss Jessie Metcalf of the department of biology of Wayne University, Detroit, for her invaluable help in the preparation of materials relevant to her field and for her criticisms and suggestions regarding the presentation of subject matter; to Miss Marian Breckenridge for her aid in preparing manuscript; and to her and to Mrs. Elise Hatt Campbell for criticism and suggestions resulting from their experimental use of the manuscript in classroom teaching.

The authors also desire to thank the D. Appleton-Century Company, Incorporated, for permission kindly granted to publish numerous quotations from Stuart's "Healthy Childhood" and the White House Conference Reports.

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GROWTH AND DEVELOPMENT OF THE YOUNG CHILD

CHAPTER I

WHAT THE NEWBORN BABY IS LIKE

HOW HE BEHAVES

IF we are going to study the growth and development of young children we shall probably find it most interesting to look at a real baby as he first makes his bow to the world. Perhaps some of us have never seen a newborn infant. Most people who look for the first time upon a newborn child are a bit shocked. It is difficult to imagine in advance how tiny, how helpless that newly arrived bit of humanity is. We have a feeling that if we picked him up he might break. Yet, if we try to hold one of those constantly moving arms or legs, or if we slip a finger inside of that tiny fist, we shall get an impression of sturdiness that should serve to reassure us. Let us look at this young person more closely.

Body Proportion.—At birth the baby must immediately begin to make certain necessary adjustments to life. To breathe is of absolutely primary importance. With the taking of air into the lungs, the baby must establish its own circulation and oxygenate its own blood. When he has done this and when the cord has been severed and dressed, he can be said to begin his independent life. As one examines a newborn baby, one realizes how different he is in contour from an adult or even a little child. The whole upper part of the body seems out of proportion to the legs, which are short and almost seem bowed as they are held with the soles of the feet facing each other. The abdomen seems unduly large due to the fact of the size of the liver which is proportionately about twice the size of an adult liver. As the natural food

for the infant (breast milk) is deficient in iron there is a storage of this mineral in the liver during fetal development which serves as a reserve for the infant during the period of breast feeding.

Head.—The head, as has been said, is slightly larger than the chest. According to Feldman^{36*} the height of the head in an adult is only one seventh of the total height, while that of the infant at birth is as much as one fourth of the total height of the body, so that an infant's head is proportionately twice

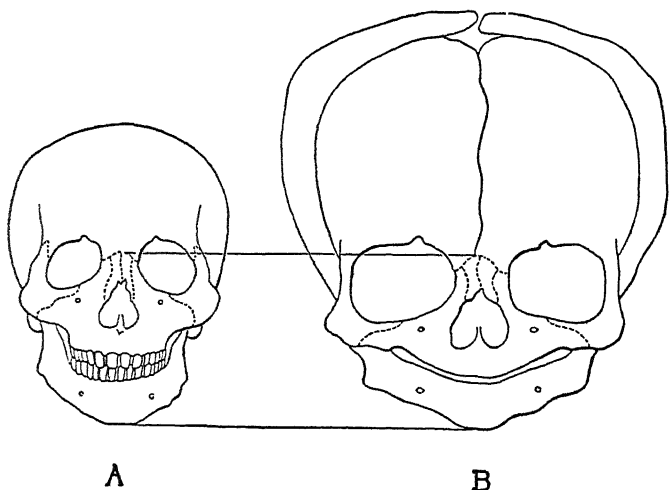


Fig. 1.—A diagram illustrating the postnatal changes in the proportionate height of the cranium and face. A, Adult skull. B, Skull of a newborn child. The two specimens are drawn so that the facial heights (from nasion to pogonion) are equal. (After Holl.)

as large as that of an adult, although absolutely it is much smaller.

The most striking characteristic of the skull is the relation of the cranium to the face. The relation between the two at birth is as 8:1 as compared to the ratio of 2:1 in the adult. This ratio of 8:1 is reduced to 6:1 by the end of the second year.

* Numbers refer to the Bibliography in which the references are arranged in alphabetical order.

The circumference of the head (occipitofrontal) according to Grulee⁵⁶ is equal approximately to one half the length of the body plus 10 cm., and is equal to or exceeds slightly the circumference of the shoulders, and is about 2 cm. more than that of the chest at the nipple line. The head circumference is usually 1 to 2 cm. less than that of the abdomen. These relationships are not, however, perfectly constant, as the amount of body fat varies in each individual.

The Face.—The upper portion of the face is much more completely developed than the lower. The orbits are large and rounded with sharp margin. The nasal aperture is large,

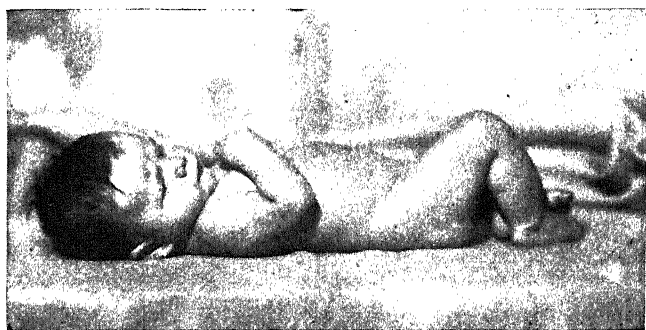


Fig. 2.—A three-months-old baby. Illustrates the length of trunk in comparison to the length of arms and legs and the proportion of length of head.

broad, and rounded, and the inferior nasal spine is well marked. The upper and lower jaw are broad and very low. They present a series of rounded elevations that contain the dental sacs of the milk teeth. The base of the skull is small compared to the top which extends beyond it laterally and posteriorly.

The Arms.—The arms are relatively shorter than in the adult. The clavicle (collar bone), the first bone in the body to ossify, is short and therefore helps to produce the narrow sloping of the shoulders of the infant. The radius and ulna of the forearm are more nearly equal in thickness than in the adult.

Pelvic Cavity.—The pelvic cavity of the newborn is much smaller relatively than in the adult and is more vertical in position than lateral. Sexual differences in the pelvis can appear as early as the fourth fetal month and are quite marked at birth, the pelvis of the newborn male being larger than that of the female. During the first two years the pelvis grows rapidly in all dimensions.

The Muscles.—In the newborn the muscles of the head and trunk form a little over 40 per cent of the total weight of the musculature, while in maturity they form 25 to 30 per cent. Apparently the muscles do not grow as fast as the remainder of the body during infancy, but in later childhood they increase so rapidly that at puberty, as in later life, they form 40 to 45 per cent of the total body weight.

The Bones.—The bones of the newborn baby are soft and cartilaginous. Certain bones which unite later are unconnected. This makes the skeleton of a baby more flexible than an adult's and less liable to fractures* or dislocations. It also makes possible a molding of the head a fact of great significance in the birth process, which is to be discussed later in the book.

The Skin.—The flesh is firm and elastic and the skin as soft as velvet. The color is a deep pink or even red which usually fades rapidly to the traditional rose petal pink of babyhood. There may be a soft downy growth of hair over the body, especially on the back, when the baby is born, but this, too, disappears very shortly. Covering much of the body, especially the back and creases, is the vernix caseosa, a soft cheeselike fat substance, the product of the glands of the skin. This is easily removed when the baby is first oiled or greased and it does not reappear. The baby's breasts sometimes seem enlarged and may contain milk but this condition disappears within a few days and needs no treatment.

Hair and Eyes.—The head may be covered with a fine downy growth of hair, which usually comes out in the first

* If a fracture does occur in a little child or baby it is usually a so-called "greenstick fracture"; that is, the bone bends and splinters as a green stick rather than breaking sharply as a dry twig does.

few months. Some babies have quite a heavy growth of hair, others have almost no hair. The eyes are a stove black-blue color which gradually changes to whatever the permanent color may be. There are no tears for some weeks at least. As there is difference of opinion as to just when tears appear, there is probably much individual difference as to the time.

Mouth.—The cavity of the mouth in the newborn baby is very shallow, the hard palate is flat, and has not the concavity characteristic of the adult palate. The mouth is dry owing to the imperfect secretion of the salivary glands. In the act of sucking, the infant uses the tongue, hard and soft



Fig. 3.—A six-months-old baby. Illustrates the length of trunk as compared with length of arms and legs.

palates, the two cheeks, the uvula, the gums and the lips. The act is greatly facilitated by the sucking pads, small masses of adipose tissue in each cheek. The function of the pad is supposed to be to distribute atmospheric pressure and to prevent the drawing in of the cheek and buccinator muscle between the gums during the sucking act. The sucking pad persists throughout childhood and even into adult life. When the child's mouth assumes the position for sucking there are formed three cleftlike spaces through which fluids can be carried to the pharyngeal cavity.

Teeth at Birth.—Occasionally a baby may show one or two teeth at birth, but this is unusual. The salivary glands are

only slightly active at birth but become increasingly so at about four months, and as the baby has not yet learned about swallowing the increased saliva, he lets it run out of his mouth and is said to "drool." As this usually occurs at about the same time that teeth begin to appear it is by many people attributed to the teething rather than to the real cause.

Cord.—Within a few days the cord begins to shrivel and dry up and eventually drops off, leaving the baby's umbilicus or navel slightly raw for a few days. The cord may come off within a week or it may be two weeks or longer but this is no cause for concern. The important thing is, that it shall be kept free from infection.

Respiration.—According to Scammon* the number of respirations is from 40 to 45 per minute at birth and is reduced to 25 by the end of the first year. Later the number of respirations is reduced gradually. With increasing age the individual respiration grows deeper, the mechanism works more economically, and shows greater elasticity.

Heart.—The absolute weight of the heart in the newborn baby averages from 20 to 25 Gm. about one twelfth the adult weight of the organ. The evidence available shows that the heart changes very little for a month to six weeks after birth. Following this period the heart grows steadily, doubling its weight in the first year and by five years quadrupling it.

The heart rate remains lower for the first days of life than it is at birth, which is from 130 to 160. After about ten days extreme variations in rate are extremely common influenced by factors such as wakefulness, sleep, movement, feeding, crying, and physical discomfort. Acceleration up to 174 and 188 has been recorded as a result of crying and active movement. There is no doubt that the heart rate of an individual progressively decreases during childhood. The most pronounced decrease in rate comes during the first three years and a steady but more gradual decrease continues until an adult rate is reached, probably about the eighteenth year. Under standard conditions it is rarely above 100 at five or six years, 90 at nine years and 85 at twelve years.

* Quoted from Feer.³⁷

Temperature.—The healthy infant maintains a temperature between 98.2° and 99° F. almost continuously without the aid of external heat. However, since the heat-regulating mechanism in the baby is incompletely developed and unstable, unnecessary exposure to cold cannot be met as successfully as in the adult. Clothing therefore becomes important as a protection against sudden losses of heat by radiation and against too long continued exposure to cold. Too heavy clothing may on the other hand cause waste of energy in perspiration, restriction of freedom of movement, and discomfort.

Weight and Height.—A baby's average weight at birth is from 7¼ to 7½ pounds, and its length about 20 inches. Boys as a rule are slightly heavier and longer than girls. There is a wide variation in weight, but a child weighing less than 4 or 5 pounds at birth rarely thrives, though a few cases are on record of children surviving, who, when born, weighed only 1 pound. Babies sometimes weigh 9 or 10 pounds but babies over that are unusual and if much over 10 pounds present a grotesque appearance. There is a usual initial loss of weight of from 6 to 8 ounces during the first week in life, but after that the increase in rate should continue steadily at a fairly uniform rate. There is less variation in height than in weight. Generally speaking, babies of first pregnancies are smaller than babies of later pregnancies.

SENSORY EQUIPMENT

Fairly Well Developed at Birth.—The sense organs and central nervous system are fairly well developed at birth, and the growth is so rapid that they are nearly as sensitive to stimuli at three years of age as they will ever be. Sight, hearing, taste, smell, and touch, however, seem far from efficient in function at birth. There are few carefully checked studies to show just how efficient the senses are or how they develop, but a number of observations of newborn and young infants are available in published form.

Two Types of Studies.—Most of these observations (Shinn,¹³² Preyer,¹¹¹ Rasmussen,¹¹⁵ Fenton,³⁸ etc.) are studies of individual children, and are valuable as studies of patterns

of growth but, since most of the children thus observed were mentally superior children, they cannot be used as standards for mentally average children. Several studies of groups of young infants (Blanton,¹³ Gesell,⁴⁸ Simon,¹³⁵ Watson,¹⁶⁹ etc.) have been made, however, which are useful as standards. These latter writers agree fairly well in their conclusions about the sensory equipment of the newborn infant. Their views are given in the following discussion:

Sense of Touch.—They find that the sense of touch is the most nearly perfect in function at birth, the greatest sensitivity being found in the lips where a slight touch sets up sucking movements. Several writers report that a touch on the nose is followed by closing of the eyes, and that blowing on the face causes drawing away or crying, depending upon the vigor of the air stream. Koffka⁷⁶ reports that the bathing water must be the right temperature or it will be refused by the infant; all writers agree that the temperature which surrounds the baby should not vary markedly or he will become uncomfortable, but that he does not seem to be particularly sensitive to stimulations of heat or cold on small areas of the body. All writers report that the sensitiveness to pain is not acute, and several comment upon severe scratches or blisters that do not seem to cause discomfort to the baby.

Sense of Smell.—Not many observations on the sense of smell have been made. Shinn, Stern,¹⁴¹ Preyer, Koffka, Dearborn,³¹ and Valentine¹⁵⁹ each report one or more instances in which the odor of a drop of milk or a drop of perfume caused the infant to stop crying, or in which the odor of petroleum, oil of amber, or other evil-smelling substance caused an avoidance reaction.

Sense of Taste.—Opinions about the sensitivity of the sense of taste differ. Shinn says there is no sign of a sense of taste until some days after birth. Preyer, Koffka, Fenton, Dearborn, and Stern, on the other hand, all report instances in which markedly bitter, sour or salty flavors were rejected by newborn infants, while sweet or mintlike flavors were accepted. Fenton reports that castor oil was objected to violently by a six-day-old baby; Dearborn found no objection

when it was given to his child of one hundred nineteen days of age. It seems quite evident that sugar is a welcome taste, and, once given, is missed if removed from the diet later.

Sense of Hearing.—All writers seem to agree about the sense of hearing. They assure us that children are deaf for a few hours after birth. Many report reaction to violent sounds within a few hours, however, and all writers report instances of reaction to such sounds as harsh or sudden noises, the tick of a watch, a long, low whistle within the first week. Shinn reports no sign of reaction in a twenty-six-day-old infant to either high or low notes struck on a piano; Valentine, however, reports that his baby on the twentieth and fiftieth days stopped crying at once when low chords were played loudly on the piano.

Sense of Sight.—The sense of sight is so imperfect at birth that reactions to sudden and pronounced changes of light seem to be the only sight reaction observed by any of the writers on the subject. Stern says that the seeing of objects is out of the question. Preyer, however, reports that on the eleventh day, his baby fixed its gaze upon the light. Dearborn reports that his baby "looks interestedly at her mother's face" on the thirteenth day; Shinn's niece "maintained her glance on pleasing, bright surfaces" at the end of the second week. Seeing as an "intelligent, active expression" is reported by Preyer on the twenty-third day, Shinn on the twenty-fifth day, Valentine "before the first month is over." Such attention to objects is probably to be regarded as achieved by average infants during the first month.

The Infant Must Learn to Use His Sensory Equipment.—The newborn infant, then, is possessed of the equipment for sense reactions, but he must learn by practice to use it effectively, and must, through experience, associate meanings with the vast number of sensations which he has learned to entertain by the time he is a month old. Born into a "buzzing, booming confusion,"* he finds his senses bombarded with meaningless experiences against which the imperfection of his sense equipment gives him fair protection at first but little protection after he is a month old. The task which lies ahead

* James.⁶⁷

of him is to learn skillful control over his sensory equipment so that he may use it effectively and selectively upon his environment, thus providing materials for his growing intelligence.

MOTOR BEHAVIOR OF THE NEWBORN INFANT

One of the most interesting things about so tiny a being is that he is a fairly efficient living machine. Until he is born, the child's breathing, eating, and eliminating have been done for him by his mother's blood stream. At birth he suddenly comes into the need of doing these things for himself. The birth cry is usually given credit for inflating his lungs and introducing them to the task of respiration. A touch on the infant's lips sets up a sucking movement, a motor response which upon presentation of the mother's breast furnishes the infant with his food. Even though he does these organic things for himself, however, he is still entirely dependent upon others for his food supply and for his physical needs.

Random Movements.—Outstanding in the motor behavior of the newborn infant is his almost ceaseless random movement during his waking moments. He wriggles, stretches, fans his hands, waves arms and legs, and moves his lips, his eyes, his nose. These movements are notable because of their random, uncoordinated nature. It is not unusual, however, to find an infant of a few hours' experience picking out and learning the coordination necessary to place his fist in his mouth repeatedly.

Reflexes.—The newborn infant has a surprising number of reflexes, being possessed of most of the reflex behavior peculiar to human beings at any age. He gasps, coughs, chokes, sneezes, swallows, hiccoughs, and yawns with facility. Whether or not he winks in response to objects threatening the eyes is a point of dispute among authors. Tanner¹⁵¹ says that the first winking appears between the forty-third and sixtieth days; Watson¹⁷¹ says that it occurs the first or second day; Koffka⁷⁶ says that the eyelids do not close when an object threatens the eyes at birth, while Shinn¹³² observed a closing of the eyelids in the first day when bright light or a touch

threatened the eyes. Gesell⁴⁸ states that winking occurs during the first day.

Two reflexes are present at birth, but disappear later, and while present, indicate an immaturity of spinal centers. These are the Babinski (a "fanning" of the toes with an extension of the great toe, when the sole of the foot is stimulated) and the grasping or darwinian reflex, which is so strong that some infants can support their entire weight in mid air while hanging to a rod with one hand. According to some authors the Babinski is not present in all infants. The only dispute about the presence of the darwinian reflex at birth is one concerning the amount of strength the infant displays when grasping. Watson says that the grasping reflex is present in practically all normal babies. Both the Babinski and the darwinian reflexes disappear as the spinal centers mature. The Babinski is usually gone at the end of six months and is never present after the second year if development is normal. The darwinian is distinctly weakened at the end of a month and is usually gone by the fourth month—at about the time when purposeful reaching is established.

EMOTIONAL BEHAVIOR OF THE NEWBORN INFANT

The newborn infant is capable of emotional response apparently so complicated in its mechanism that it calls into play almost every part of the body. Just what rouses his emotions and just what emotion he shows as the result of specific stimuli is a matter of dispute. But that he becomes roused to emotion by remarkably few types of stimuli and that the number of his emotional reactions is limited seems to be agreed upon by recent writers.

John B. Watson's View.—Watson¹⁶⁹ in collaboration with Mrs. Mary C. Jones at Johns Hopkins University and at the Heckscher Foundation in New York City found that the newborn infant is capable of only three emotional responses, namely, those of love, of fear, and of anger. He found also that these responses can be roused only by an extremely limited set of stimuli. Fear, expressed by crying and clutching movements, is roused by a loud noise like the banging of a dishpan or

the slamming of a door, and by loss of support as when the blanket is jerked from under the infant, or when he is carelessly handled. Anger, expressed by stiffening of the body and loud crying, is caused by hampering of bodily movements as when the head is gently held in one position or the arms and legs gently pinioned to the sides. Love, expressed by cessation of crying and gurgling, cooing, and visceral reactions, is roused by stroking of the skin, particularly of lips, face, breast, and the sex zone.

Criticisms of This View.—There has been a tendency in child training literature to accept Watson's findings in this field as final since his work was carefully done and stood as the only study of its kind for several years. Watson himself in his more serious writings has never claimed omniscience in this matter, but has appreciated the limitations of available scientific work in this field. Jones⁷¹ in discussing the emotional responses of young infants says that Watson omits mention of the emotional reaction to pain. Although infants are not acutely sensitive to pain, there can be no question that pain stimuli elicit emotional responses even during the first few weeks.

Sherman,¹³¹ writing after extensive work with infants, says that they show an emotional response to puffs of air against the cheek. He found, too, that when he dropped infants through several inches of space (sudden removal of support) they did not always respond with emotional behavior. He took motion pictures of his experiments, getting pictures of the various stimulus situations and of the infants' responses. He then cut the film and reassembled it so that the responses which had been characterized as "anger" responses followed the so-called "fear stimuli" and so on. He showed this rebuilt film to a number of psychologists, none of whom were able to discriminate clearly between the various emotions displayed. Thus Sherman won his point that the emotional behavior roused by various stimuli applied to infants is of a general rather than of a specific nature; we cannot be sure whether the infant is showing fear or anger or any other specific emotion.

What Is Generally Accepted.—This much seems clear from

all studies that have been made: The emotional behavior of infants is limited; it is roused by probably not more than four or five distinct stimuli; it becomes varied in kind and amount depending upon the experience of the child; early emotional experiences may make deep impressions which last into adult life, molding adult ideas and behavior. Whether or not the final emotional pattern of adult life is set by the age of two years, as Watson maintains, is a point of dispute. That it is set to an important degree by the age of seven is unquestioned by most writers in education and psychology. Many writers feel that the pattern of emotional behavior cannot be changed after adolescence, although the most astute observers of human behavior know that it can be changed at any age if the individual is willing to make the effort. The point is that after adolescence the effort required to change emotional behavior is tremendous—almost superhuman—and few people ever become sufficiently interested to attempt it.

BEHAVIOR WITH REFERENCE TO FOOD

The newborn normal baby is not in immediate need of food and is usually not put to the breast for twelve or more hours after birth, giving the mother ample opportunity for resting after the exertion of labor, and giving the baby an opportunity to lie undisturbed, warm and quiet during the first hours of adjustment to his new environment. The lips and tongue of a baby, as has been said, are extremely sensitive to touch, and the stimulus of a touch on the lips is sufficient to start the sucking reflex, but the fact that the baby sucks does not always indicate that he is hungry. There may be some difficulty, however, in the first few days in getting the baby to nurse satisfactorily, and those first few nursings must not discourage or worry the mother. She must think of it as one of the first learning processes which the baby is going through, and realize that it will take a little time before the habit is well established. The act of the baby's sucking at the breast not only stimulates the breasts to secrete milk, but in the first few days after birth stimulates uterine contractions and so assists in the involution of the uterus.

For the first few days, the fluid in the mother's breast is colostrum, such as could be expressed from the breasts during pregnancy; but by the third or fourth day, the mammary glands begin to be very active and the breasts become full of milk.

ELIMINATION

The baby may pass urine during the birth process, or if not, within a few hours after birth. He is likely to pass it frequently for an hour or two after eating and then less frequently until more fluid is taken into the body. The bowels move within a few hours, and for the first few days the movements are a dark green, tarry substance called meconium, the material which has collected in the intestines during fetal development. The colostrum which the baby gets during the first few days of nursing, besides having some slight nutritive value, may act as a laxative which helps rid the bowels of meconium. When regular feeding is established, the stools change to a color, consistency, and odor characteristic of the food which the baby receives. If a breast-fed baby, the stool is a golden yellow, a soft pasty consistency, acid in reaction, and with a characteristic odor. A breast-fed baby usually has from two to four movements in the course of twenty-four hours. If a bottle-fed baby, the composition of the formula will cause a characteristic stool. If the formula is similar in composition to the composition of mother's milk the stools are usually fewer in number, a lighter yellow, a little less pasty, and with a somewhat different odor.

SUMMARY OF PHYSICAL PICTURE

The newborn is not a "little adult." His body proportions differ from an adult, his trunk is long as compared to his legs, the circumference of his head is almost equal to that of his shoulders, chest and abdomen, his bones are soft, the muscles of his head and trunk form 40 per cent of the total weight of all his muscles. The upper part of his face is much more completely developed than the lower. His rate of respiration and pulse are higher than the adult.

SUGGESTED QUESTIONS

If a baby were placed in the class room, how could you tell whether he was a newborn or older?

What are the reasons for the young infant's need of sleep?

Why does the character of food and elimination differ during the first few days from that which follows?

What equipment for learning has the newborn child?

What difference in his care does his limited emotional responsiveness make?

What did you learn about the baby's reactions to temperature and flavor that will make a difference in preparing his bottle?

Is it necessary or desirable to "tip-toe" about the house because the baby is asleep?

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CHAPTER II

GROWTH DURING INFANCY

Education Begins at Birth.—Not many years ago the word “education” was used to connote formal school training only. “Education” was supposed to begin upon entrance to school, to consist of the “three R’s,” and to end when the individual left school. A generation ago there was no widespread appreciation of the fact that real lessons in life and real ability to achieve success in the art of living were learned, not in the schoolroom, but in contacts with life itself. There was little understanding of the fact that desirable character and personality traits and a strong physical body could be produced by “education.” Least of all was there awareness of the fact that the most extensive, the most important learnings in life, have taken place before the child enters a formal schoolroom.

Practically all of the outstanding contemporary writers in Psychology and Pediatrics agree that the years from birth to school age (five or six years) are occupied with learnings which are as important as, if not more important than, any which occur later in life.*

Blanton¹⁴ has expressed this viewpoint when he says, “The minuteness, the inevitableness and the multiplicity of causes of all behavior point at once to the earliest years as the most vital to training. It is still too often assumed that education begins at school. The emotional personality and habitual slants begin at birth; the child may be said to graduate into the schools. Parents have complained that modern life is taking their children from them. If this has been true, then the newer philosophy of child training gives them back. Children do not go untrained until school age, or until the school hour. They are being trained somehow, somewhere, every hour of their lives, sleeping or waking.” And again:

* Twenty-eighth Yearbook N. S. S. E.¹⁵⁸

"Education for successful emotional and habitual living begins at birth. And since it begins with birth it deals with such commonplace things as sleeping and eating and moving and crying. It never leaves the plane of the small and the apparently insignificant, for no matter how spectacular the result, it is composed of small acts, performed day by day and moment by moment."

It is not difficult to see, then, that old ideas of formal training must yield to a far broader interpretation of the word education, which is now interpreted to mean that education is life and growth—as broad as life, as continuous as growth.

Education Must Be for Both Body and Mind.—It used to be thought that a child could be prepared for the future by theorizing and studying in the present. But we now know that study, whenever it develops the mind while depriving the body of wholesome growth or while warping the character and personality of the child, is indeed a false preparation for life. We now know that the only way to insure a sound physical body in adulthood is to develop sound physical habits and a strong body in childhood; that the only way to insure desirable character and personality traits in adulthood is to establish them as habits in childhood; and that, far more important to success and happiness in adulthood than the acquisition of formal academic training is the possession of a healthy body and a healthy personality. Each day the child lives he forms good habits or bad habits of living; each day these habits become more fixed, and thus each day more firmly determines the outcome of the next day.

MOTOR DEVELOPMENT

Even the Tiny Infant Learns Through His Successes and Failures.—Motor accomplishments grow from the simplest beginnings in reflex action and in random and uncoordinated movement. The newborn infant promises little of the motor skill and bodily grace of the five-year-old child. During the first three months a good deal of general bodily movement takes place with stretching and waving of arms and legs. At this time, as well as later, freedom for such activity is essen-



Fig. 4.—This three-months-old baby is watching the movements of his own hands with absorption and is discovering that he can move them at will. He is not sitting alone but is being supported from behind.



Fig. 5.—At three months he can lift the upper half of his body and, by pulling his elbows under him, can stay up for an appreciable length of time.

tial and the clothing, although designed for protection, should permit as much freedom as possible. There should be certain periods (many mothers provide these at bath time) when the infant may stretch and kick entirely free of clothing, for it is only by practice that he can achieve strength and coordination. If we watch a tiny infant we can see him experimenting with his body, gradually learning to isolate out of his random activity those movements which give him results. The hand-mouth coordination resulting in the satisfaction of sucking on an object is a case in point. Sometimes in the course of random movements of his hands he gets his fist in his mouth. As we have seen, a touch on his lips sets up sucking movements which are associated with the satis-



Fig. 6.—At six months he can propel himself by wriggling.

faction of feeding. Because this chance movement of his hand brings him satisfaction the child is more likely to repeat it. Many infants thus learn to guide the fist or fingers accurately into the mouth within a few days after birth.

So by trial and error, with the right movements accompanied by the satisfaction of success, the wrong movements resulting in failure, the child gradually learns the management of his own body.

He Has Learned Much by the Time He Is Three or Four Months Old.—By three months he has learned to connect his hand with his mouth, in a fair measure to focus and coordinate his eyes, to guide his hand with some degree of sureness by his eye, to pull or push his feet and hands with good coordina-

tion and strength; he has, in other words, learned some really voluntary control of his own body. He can hold up his own



Fig. 7.—A superior child of six months of age who has learned to crawl
“on all fours.”

head without support by the time he is three to four months old; if prone on his stomach he can lift the upper half of his



Fig. 8.—He can sit upright at six months of age, but is “wobbly.”

body and, by pulling his elbows under him, can stay up for an appreciable length of time.

He Soon Manages to Get from Place to Place.—If he is not hampered by his clothing, he learns by the time he is six months old to turn himself over from the position just described, so that he becomes free to change his position in his crib if he needs to. It is sometimes from this position that in his wriggings he discovers he can propel himself, and he may by five or six months be getting himself from one place to another by hitching himself along on his stomach.

At four or five months he can sit up for short intervals if sufficiently supported by pillows. At six or seven months he



Fig. 9.—This ten-months-old child needs no support as he sits upright. He can maintain this position for an indefinite period.

can sit with slight support, falling over only when he becomes tired or when his general wriggings or a desire to reach something upset him. At six months he can make stepping movements if held under the arms; at eight or nine months he has usually learned some technic or other which serves to get him from one place to another with ease. Sometimes he travels on "all fours," sometimes sits and hitches himself along with his heels, sometimes scoots along on one hip using two hands and the opposite foot for propellers. Probably the creeping method he adopts is determined by the way he first happens in his wriggings to establish locomotion.

Stern¹⁴¹ and Koffka⁷⁶ agree that many children can stand alone for a few seconds without support at nine months of age.

Learning to See.—The baby learns the muscular movements necessary to vision (accommodation and convergence) by much the same trial and error process. At two months he has learned to adjust and hold his eye muscles to see large objects. He “notices” the approach of a person, a change from one room to another, and so on. At four months he sees with much clearer discrimination, but is still not likely to notice an inch cube placed before him. At six months he sees

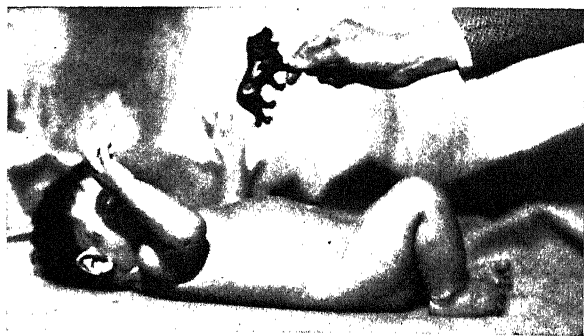


Fig. 10.—This three-months-old baby sees the proffered toy and is trying to get it. Note that the control over his hands is not yet established and that his first attempts to obtain the object pull his hands away from it rather than guide them to it.

very small objects and by eight months he not only sees them, but has achieved sufficiently good eye-hand coordination to pick them up. It is at this stage that his joy in the exercise of his new accomplishment often produces a fascination for pins and specks of dust, which distresses his mother. At this age too he reaches for things not only with his hands but with his head and mouth as well, sometimes reaching for something with both hands, head, and mouth all at once.

The Hand-mouth Coordination.—Six months to nine months is an age when the impulse to put things into the mouth is at its height; the child begins to stuff everything into his mouth indiscriminately. The mouth is an acutely sensitive

organ and serves to greatly enrich the number of touch sensations available to the baby (see also p. 42). His impulse to explore objects with his mouth is part of his gluttony for experience which increases his knowledge of the many objects which come within his reach. Because of this tendency to put everything into his mouth he should be provided with some place to play which offers him freedom, yet protection. A kiddie koop, large enough to permit real freedom of movement but capable of restricting the territory of this young gourmand, offers the opportunity for unsupervised but safe play which is essential even at this age. There should also,



Fig. 11.—This six-months-old baby has progressed in his reaching technic. He is pulling toward the object with both hands and both feet, but has already specialized to the extent that one hand is slightly in the lead. His gaze is clearly directed upon the object.

of course, be times when he can travel at large and exercise his body to its full capacity.

The Hand-mouth Inhibition.—He must not only learn to carry his hand to his mouth. A little later he must learn to keep his hand (and objects that come into his hand) out of his mouth. This learning not to put everything into his mouth we call the hand-mouth inhibition. Shinn¹³³ says that her niece learned to inhibit the hand-mouth impulse at seven months, but that this inhibition is rare before eight months. Fenton³⁸ and Gesell,⁴⁸ however, place hand-mouth inhibition at a year, where most writers place it.

He Improves Rapidly in Skill with His Hands.—Growth in the use of the hands is extremely significant during the baby's first months. At birth the hand, though strong enough in the reflex grip to maintain the body weight, is useless as a vehicle of the will. The thumb lies flaccid and helpless in the palm, or fans about uselessly. However, the hand, especially the fingers, soon becomes useful as an aid to producing sensations. The fingers of the two hands come together, touching, exploring each other as early as one month after birth. Bainard found that movements of both hands in reaching and grasping are definitely coordinated by the time the child is six months old. The thumb gains strength and

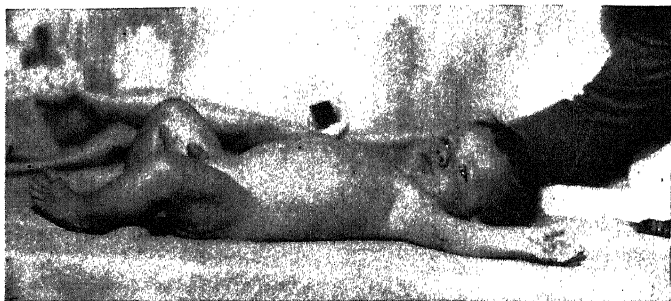


Fig. 12.—Grasping at three months. Note that the thumb is not in opposition as the far hand clutches the block.

individuality, and functions in opposition to the fingers in grasping at from two and one-half or three months (according to Dearborn, Moore, Preyer, Fenton) to six months (according to Watson). The greatly increased efficiency of the hand as an organ for grasping when the thumb is in opposition can be seen if the reader will try closing the thumb into the palm of his hand before grasping an object, and will then release the thumb so that it can oppose the fingers as is normal in adult grasping or picking up of objects. The baby's hand is usually sufficiently skillful at six to eight months to pick up a common pin.

Hand Preference.—The question of preference in use of hands rises here, since a good deal of our encouragement

of one hand or the other should depend upon whether or not children naturally show preference for right or left and upon whether or not a forced change is injurious. We do not as yet have enough studies to establish at what age preference, if any, should appear. Watson¹⁷¹ found that 96 per cent of adults are right-handed, but could not conclude how much of this preference was native and how much trained. Gesell⁴⁸ found that 19 per cent of children showed preference for one hand or the other in reaching at six months of age, 50 to 65 per cent at nine months, and 65 to 80 per cent at twelve months. Lippman⁷⁹ states that at four and one-half months children in accepting an object use either hand, one as frequently as the other. But from four and one-half months on there is a gradual increase in favor of the right hand with 72 per cent of preference for the right hand at twelve months. Jones⁷⁰ reports a wide variation in handedness in individual cases between eighteen and sixty months of age. Wellman¹⁷³ in a study of preschool children found an increasingly greater difference between the use of the two hands throughout the preschool years.

Preference for the right hand by the age of one year seems clear for most children, but whether this preference is native or trained is not clear. Much can be done to encourage the use of the right hand by giving the baby things toward his right hand, but insistence upon use of the right hand if the child seems persistently more awkward with the right and more skillful with the left hand seems unwise, especially if encouragement of the use of the right hand meets with emotional resistance from the child. Reference to the matter of handedness is made again on page 153 in connection with the development of speech.

Desirable Playthings.—A ball or rattle hung by a cord over the cradle will give a two- to four-months-old baby much practice in reaching and grasping, in directing his hand to strike an object, and in coordinating the eye muscles to follow a moving object. The plaything should not be left there all the time, however, especially if the child is subject to overstimulation or overfatigue, nor should it be left close enough to his eyes that the lessons in convergence will teach a habit

of fixating at too close a range and hence tend to turn the eyes inward. From three to five months control of grasping and holding develops sufficiently to make a string of large wooden beads or spools a desirable plaything. Inflated rubber animals (not too large ones) are light in weight, easy to hold and easy to wash. A piece of crumpled tissue paper makes an intriguing noise when pounded or squeezed, and along with a rattle to jingle when waved, adds other opportunities to teach through the ears, as well as through the eyes, the connection between movements of the hand and results obtained.

SENSORY DEVELOPMENT

The Sense of Touch.—The sense of touch is used consciously to produce sensation by the time the infant is a month old. The tongue and lips seem to be used first for this purpose. Shinn¹³² reports that her niece used the tongue for active touch at five weeks, putting her tongue out and drawing it back between tightly pursed lips. Before the third month fingers are used consciously to produce touch sensations. Valentine¹⁵⁹ reports that on the eighty-eighth day his baby touched the fingers of one hand with the other, looking at them meanwhile. Shinn says that by the third month hands rival tongue and lips in building sense perceptions, and that during the twelfth week the "little fingers fumbled and felt over our hands and dresses, learning active touch." Dearborn³¹ reports that L. at seven months rubbed her fingers over the bristle of her hair brush, shivered and withdrew her hand vigorously.

The Sense of Pain.—Pain, at least skin pain, remains slow in development. Sensitiveness to colic pain or gas pressure is apparently acute during the first weeks of life; but Dearborn reports that on the seventy-ninth day pinching the finger to a degree which would be unpleasant to adults caused no sign of discomfort. A slight pinching on the three hundred forty-first day (about eleven months), however, caused crying.

The Sense of Smell.—Smell continues to develop from early infancy and by the seventh or eighth month is controlled consciously by inhalation of breath if the child has been taught how to do this. For some months, however, the smells that

are agreeable to infants do not always coincide with judgments of adults in the matter. For example, Dearborn³¹ reports that on the three hundred forty-fourth day (about eleven and one-half months) his baby showed no dislike for the bad odor of rancid fish oil belonging to some small fish vertebrae she was playing with, but smelled of them deliberately to repeat the experience. He also says that on the three hundred sixty-first day the odor of a fresh marigold was distasteful and caused her to turn her head away. As late as the seventeenth month Preyer¹¹¹ reports his baby as unable to separate the sense of smell from that of taste, since he opened his mouth upon presentation of a fragrant flower. This mistake was not made by this baby after eighteen months of age.

The Sense of Taste.—The sense of taste seems to be fairly discriminating at the end of a few months. Preyer reports an accurate discrimination between salt and sweet, which are two taste impressions of like sort. Dearborn's child refused the sourness of a fairly sour orange on her two hundredth day. Shinn¹³³ reports that taste of new foods became a source of pleasure to her niece during the first fortnight of the eighth month. Preyer reports that a new taste gave great surprise at the ninth month. The baby's judgment of pleasure in taste, like his judgment of smell, does not always correlate with adult judgment. Dearborn says that his baby seemed to enjoy a bitter taste on his two hundred seventy-ninth day (about nine months), and did not object to castor oil until the three hundred eighty-fifth day (about thirteen months). She showed no objection to the bitterness of *nux vomica* on the five hundred seventy-seventh day (about nineteen months). This is important to remember in relation to the feeding of children, since children frequently accept without objection foods which have high nutritional value but which many adults consider distasteful, such as kidneys, turnip, liver, etc. Discrimination in taste can be developed early and should be trained to include a large variety of experiences through the introduction of new foods into the diet as soon as the physician prescribes them.

The Sense of Hearing.—Authorities differ in their reports about reactions to sound, both about the type of sound rousing

reaction and about age at which reactions occur. Nearly every writer, however, agrees that sharp or quick sounds cause blinking, starting, and sometimes crying during the first few days of life. As we have seen, Valentine and Dearborn disagree as to whether or not sounds on the piano are heard during the first weeks of life. There is no disagreement after the second month, however, and several writers mention instances of reaction to piano, bells, the human voice between the second and fourth months. Association between a sound and what it means seems to be present by the second or third month if the sound heard has become familiar; for example, the step of an approaching person seems to have become associated with personal attention and is sufficient to cause the baby to stop crying. Preyer says hearing is acute by the fifth month, since the baby, even while taking his milk, will turn his head at rather slight noises. By the middle of the fifth month Shinn's niece seemed to notice hoarseness in her aunt's voice. Dearborn says that his baby on her one hundred sixty-first day (five and one-half months) "certainly knows her name perfectly," since when being entertained she would turn her head upon hearing it. Shinn's niece recognized her own name at the end of the sixth month, and enjoyed outdoor sounds like notes of birds or stamping of horses in the stable by the ninth month.

The Sense of Sight.—Clear sensations of sight are dependent not only upon adequate development of the nerve endings and nerve centers for vision, but also upon two sets of muscular adjustments—one set which is necessary to turn the two eyeballs (convergence) and the other set which controls the lens within the eyeballs (accommodation). These two sets of muscular adjustments must be learned accurately before the eyes are effective as sense organs. This has been discussed briefly in connection with motor achievements. Sight perception, or learning to associate meaning with things seen, is dependent upon the development of motor skills prerequisite to accurate use of the eyes. These skills are fairly perfect at six months, and the development of sight perceptions goes forward rapidly from that time.

DEVELOPMENT OF SENSORY JUDGMENT

Much human behavior is made up of reactions toward objects in the environment, and is dependent for efficiency upon accurate judgments of the size of these objects, their shape, location with reference to the observer, their rate and direction of motion, and so on. Contrary to common belief, these judgments are not innate; they are learned in every detail as we shall see when we follow the pattern of that learning.

Having learned to use his eyes and ears and other sense organs, the baby must learn also to interpret the things he sees and hears; he must learn the meaning of tastes and touches and pressures. He does this by accumulating experience with things seen, heard, tasted, touched, and so on. Thus repeated sights and sounds and other sensory experiences become familiar to him. He learns the appearance of his bottle and how to react to it, the sound of his mother's voice and what to expect from it, and so on.

Each sensory experience comes to have meaning: A rattle of pans may come to mean dinner; a round red object (his ball) rolls away if one lets go of it; a bottle with clear water in it tastes different from one with milk in it; and so on. It is important to appreciate how much of the baby's behavior that seems instinctive to the casual observer is really the product of painstaking learnings. We must realize also how important it is to offer him opportunity to learn to see, to hear, to feel, and so on, with accuracy so that he may be skillful in the use of his senses which serve as the only doorways to experience, hence as the only avenue to the development of his intelligence.

The Baby's Playtime as Well as His Physical Régime is Constantly Educating His Growing Intelligence.—Infants are more than cunning and amusing objects; they are rapidly developing bodies, minds, and personalities, learning a quantity and quality of essential life lessons that will never be equalled at any later period in life. Once the child has learned to use his eyes, his ears, his tongue, his nose, and his fingers, he is placed in possession of the means of exploring every-

thing that comes within his immediate environment. If we watch an infant several weeks old we shall see him occasionally stop all his other activity to listen intently for some sound that has caught his attention. At three months we see him lying in his cradle exploring the surrounding scene with his eyes, listening with absorption to chance sounds, turning his head to "see" as well as to hear the sound. At four months he is seeing many things, is listening, and is grasping and touching objects that come within reach. He looks, he touches, he listens, associating all the results of stimulation to his senses. It is these learnings in sense perceptions and judgments, along with the achievement of control over his own body, mastery of language, expression and control of emotion, and reactions to people, which occupy the waking time of children from the time they are born.

Much Learning Takes Place by Associating One Sensory Experience with Another.—Shinn¹³³ reports that during the second week of the fourth month her niece seemed to realize a familiar touch when she felt her rattle, but had no idea that what she saw was the same thing she felt. During the fourth week in the fourth month, however, this same baby saw her mother's hand, kept her eyes on it until her own hand struck it, then took hold of it, thus associating visual and touch perceptions. By the age of six months the baby has learned to use smell and taste as well as sight, sound, and touch when he explores objects. He has learned also that lips and tongue provide not only taste sensations but touch sensations as well.

He seizes a rattle, waves it about, following it with his eyes, turning to listen; he smells it; he puts it in his mouth tasting and touching; he explores it with every sense at his command. And from this he learns about rattles; how big they are, what shape they are, how hard they are, how heavy, how near, what kind of noise they make; more than that, he is associating all of these things together, so that eventually the sound of the rattle reminds him of the proper size, shape, weight, and use of that object. "Visual, tactual, and auditory experiences are not originally interrelated in any definite and precise manner. They become related to each other in

an orderly fashion only as the subject (in our case the baby)* perfects an adequate system of localizing responses for the various stimuli that affect each sense. In this way, a person learns to identify the various experiences obtained through one sense with their proper equivalents in other sense realms."† Each object thus acquires for the baby a variety of meanings in terms of which he learns to recognize what to expect from it and what he can do with it. Important beginnings in sense perceptions and judgments are achieved in infancy. Much that is important, however, occurs later, especially when the child has learned to creep and walk and has thus greatly extended his environment for exploration. We shall, therefore, delay the discussion of the various types of sense perceptions until those chapters which deal with the ages at which each perceptual learning seems outstanding.

The important things for us to remember here are: That the task of learning control over the sense organs is one which occupies much of the energy and attention of infants; that once these controls have become fairly efficient, energy and attention are given to using them as a means of supplying associations and meanings to the rapidly growing intelligence. We should remember, also, that these meanings are rich in proportion as the environment is rich, but that the efforts of attention and the constant building of new associations are extremely fatiguing, and therefore, that the young infant must be protected from overstimulation and overfatigue.

BEGINNINGS OF LANGUAGE

What Language Is.—Language is generally understood to include any and all means of expressing feelings or thought—gestures and signs as well as written or spoken words. Many writers consider that the child's language development has begun at birth when he utters the "birth cry"; Kant, the philosopher, has suggested that the child thus expresses his "wrath at the catastrophe of birth." That the child has at birth an ego sufficiently well formed to express anything whatever, would be a point for denial by most modern psy-

* Parentheses ours.

† Carr.²⁵

chologists; but that the birth cry is a beginning toward the establishment of mechanical control over the vocal apparatus would doubtless be a point for agreement. From the moment of birth vocal responses are almost as constant during waking hours as the ceaseless random activity of arms and legs.

The Infant Makes an Early Beginning in Language Learning.—In the sense that the skills of walking can be said to develop from apparently instinctive beginnings in locomotion displayed in random muscular activity, so the skills of talking can be said to develop from the apparently instinctive beginnings in vocalization displayed in such vocal sounds. At first these sounds seem largely reflex in character, varying over a range of about twelve or fourteen vowel and consonant sounds. Within the first eight months, however, the variety of these sounds has been extended so that there are included all the sounds necessary for language; English, Spanish, French, Anglo-Saxon, German, and African sounds being recognized by Mrs. Blanton¹³ in her study of infants. The infant can be seen experimenting—holding his breath, then expelling it to get first one sound, then another, cooing, crowing, blowing bubbles, and gurgling. In this way he rapidly learns how to control the flow of air over the vocal cords so that sound results.

The Babble Stage of Learning.—From two months of age his development of control over the vocal apparatus progresses steadily. He has mastered most of the vowel as well as a few consonant sounds before he is four months old. At six months he can combine certain vowel and consonant sounds like “da,” “bah,” “ugh,” “ma,” and seems to have learned to guide his vocalizing by his ear, since he sometimes stops in his vocal play to listen and then tries to repeat the last sound he made. Often he repeats “da-da-da-da-da” or “ma-ma-ma” which may lead his parents to think that he is meaning to designate father or mother, whereas he is doubtless only exercising. This period of experimental vocalization is often referred to as the babble stage of language development.

Babbling Leads to Organized Vocal Habits.—These random babbling sounds become organized into vocal habits, according

to Watson,¹⁷¹ depending upon whether or not they produce results satisfying to the infant. For example, if the infant is surrounded by English-speaking people those sounds which are useful to English are selected for commendation and attention and hence preserved, while those not relevant to English are ignored and thus eliminated as unproductive of results. Thus random vocalizations become vocal habits, and vocal habits in turn become language habits. Tanner¹⁵¹ and Rasmussen¹¹⁵ agree that pain, weariness, fear, anger, astonishment, joy, desire, and pride can all be expressed through sound and gesture by the time the child is six months old. A very real beginning in language has thus been made during the first half year of life.

Learning the Rhythm of Speech.—By the age of nine months the random and meaningless character of the babblings seems to become softened into rhythm somewhat similar to the rhythm of flowing speech, and closely resembles the rhythm of whatever speech the child hears. It is not unusual to hear a child of ten or twelve months cooing or jabbering to himself with a rhythm which sounds like a free-flowing conversation.

Most parents have an impulse to talk to their children while bathing or tending them. This, fortunately, is a parental impulse which should be obeyed, since it provides the child not only with a model for rhythm during early infancy, but with a model for vocabulary as his development progresses. Most children have developed a sufficiently discriminating reaction to language to permit recognition of their own names by the time they are six or seven months old, and by the time they are eight or nine months old to understand either the word "no" or the tone in which it is spoken when it is used to forbid action.

EMOTIONAL AND SOCIAL GROWTH

Development of Awareness of Self.—The newborn infant has no conception of himself as a person nor of other people as different from any of the sense impressions which come to him. When he is hungry or in discomfort he cries with no thought that a person or persons must come to his relief,

but only that eventually he is relieved. Having no realization that he is attended by persons he has, of course, no consideration for the inconvenience he may cause them. He has only the sensations from his own body and the vague conglomerate sensations from the external world.

Strange as it is, he seems to become aware of other people sooner than he becomes aware of himself as a clearly defined entity. At just what age he gives indication of recognition of other people is not agreed upon by writers. Kerley⁷⁴ thinks that the first recognition appears between three and six weeks. Buhler,* writing from Vienna, says that the first

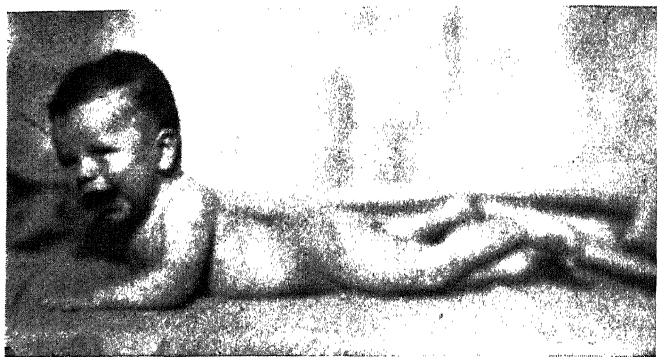


Fig. 13.—This three-months-old child has caught sight of his mother and expresses his pleasure in a smile. He can scarcely be said to be smiling at her.

really human response to appear in an infant is a smile which is evident at two or three months in response to a human face. At this time the infant seems to discriminate between one familiar individual and another. Buhler has observed that infants respond not only to adults but to other infants as well by the third or fourth month. This response consists of smiles and sounds with imitative crying. Following this, she says, is a short period of playing together, each child occupied with his own individual interests. This is similar to the parallel play of two-year-old children described later.

* Buhler, Charlotte, *The First Year of Life*, John Day, N. Y., 1931.

At about the sixth or seventh month there appears an interest in the use of each other's persons as play objects. Buhler cites also instances of offering playthings to one another and says that at eleven or twelve months this develops into co-operative play of a rudimentary sort.

Acquaintance with an Enlarging Circle of People.—Most children of six months differentiate between familiar persons and strangers. By eight or nine months they show fear of



Fig. 14.—This six-months-old child has caught sight of a stranger who was trying to amuse him while his picture was being taken. Note how animated and "social" this smile is.

strangers if too unaccustomed to them or if there has been an unfortunate experience with them. By the time a child is a year old he usually has definite preferences and dislikes for people. He does not remember people long, however, unless he has had some unusually severe emotional experience with them, and may, according to Kerley,⁷⁴ when twenty months of age, forget even his mother if she is away from him for a week. Infants should see people other than mother or nurse often enough to prevent fear of strangers, but should

be protected from persons who insist upon poking, tickling, and jogging them. It is not wise to make feeding time or bed time the time for visitors. Eating and going to sleep are serious occupations for infants; there should be no overstimulation or distractions mixed with these activities. Too many children develop the habit of playing and bidding for attention at meals when they are three months old—a habit which causes much friction as they grow older.

Too Much Attention Not Desirable.—A child of nine months seems to know when the conversation concerns him. It is certainly unwise to discuss a child in his own presence after he is a year old. Adults should not make a practice of addressing all the conversation to the child, or of letting it all center around him, whenever they are near him. If they do not avoid this very natural temptation the child may develop the false idea that all the conversation in the world must be about him, since all the conversation that he hears centers around him. He should learn early that people talk about other things and have other interests—even when *he* happens to be awake. Lessons which teach a proper sense of proportion about one's own importance in the world cannot be begun too early. There is no more miserable person in the world than the child who, accustomed to feel that the world centers around him because all he has ever known of it does so center, finds himself in a larger world of which he is only a part, and usually a most unimportant part at that.

Learning Social Responsibility Can Begin Early.—A child is never too young to begin to carry his own weight in the social scheme. At a few weeks he must learn that he may not keep adults dancing attendance whenever he cries. If he is clean, fed, and comfortable he should be left alone while mother or nurse attends to other duties. At three months he should amuse himself for appreciable portions of his waking time. At eight months he can creep after his own toy when it rolls away from him. He must under no circumstances be permitted to develop into a "bossy" baby who demands constant service regardless of the inconvenience he may cause other people. Important lessons in self-control and in consideration for others should have taken place before he is a

year old. This does not mean, of course, that he should have mastered his lessons at a year, for he will, unless unduly suppressed, still be needing to learn certain things about self-control and still be conquering certain aspects of selfishness when he is a full-grown adult. It does mean, however, that his lessons should have begun, and that in certain important ways he should be getting practice in self-control and unselfishness—those traits of character which, though very hard to learn, are indispensable to a well-rounded and healthy personality.

BODILY CHANGES

It is not an uncommon idea among people that the child is a diminutive adult and that an increase in size constitutes the principal change that takes place in his body from birth to maturity. The child's body is, however, an organism which develops through an orderly series of changes into the mature individual. The human skeleton, like that of every other higher vertebrate, in its development passes the successive phylogenetic stages of connective tissue, cartilage and bone. The progress of the several stages is, however, very unequal both in speed and in extent. It is fundamental to recognize that there are differences, both physical and chemical, in the structure, as well as differences in function of the body of the child and of the adult. A knowledge of these differences is the basis for an understanding of the growth process and the physiologic needs of the child.

Number of Bones.—There are many ways in which the bony framework of the growing infant differs from that of the adult. According to Scammon¹²⁷ the number of bones in the average full-term newborn child is 270. This number is somewhat reduced in the first two or three years of life through the fusion of primary centers which were present before birth. From this time until puberty, however, the number increases steadily through the formation of epiphyses and the ossification of the bones in the hands and feet. In the fourteenth year there are about 350 separate bony masses in the body. After puberty the number of bones is again decreased rapidly until nearly the middle of the third decade and then much

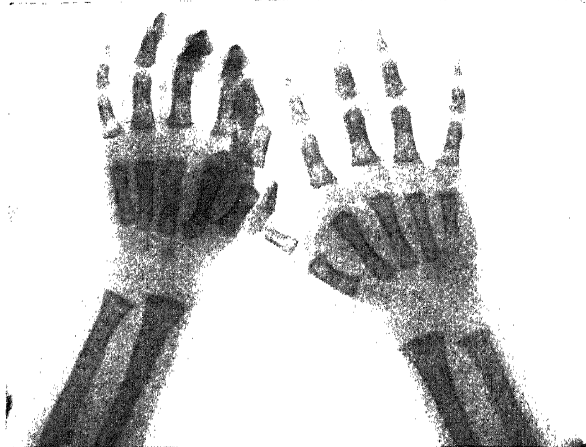


Fig. 15.—Bone age one year.

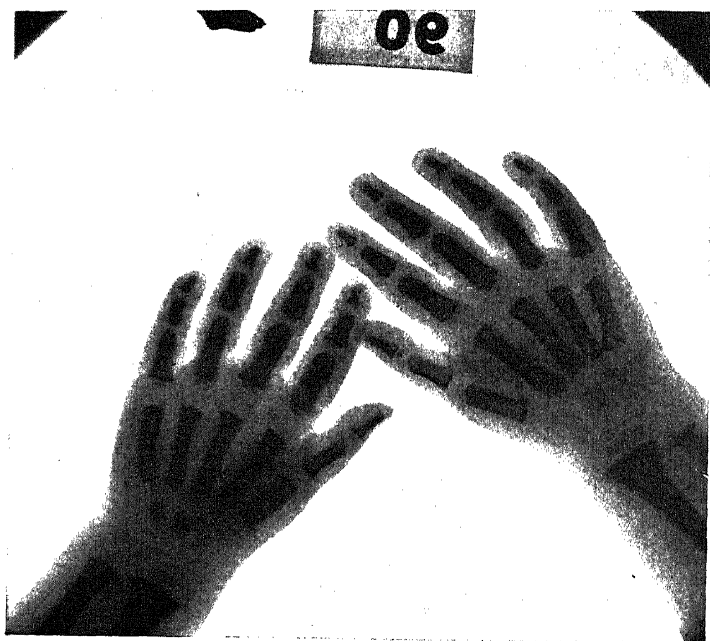


Fig. 16.—Bone age two years.

more slowly. Often it is not until late middle life that the number of bones is reduced to the quota of 206 generally accepted as the normal number in the human body.

Ossification of Bones.—Previous to the advent of *x*-ray our knowledge of the appearance of points of ossification and the development of the bony structures was largely dependent on the study of the dead specimens, but the use in recent years of the *x*-ray in the study of living children has recast our ideas. In postnatal life the appearance and development of certain ossification centers have been studied and used as indicators of physical development. *x*-Rays of the bones in the hands and feet, knee and elbow have come to be considered as among the best areas for study. Scammon¹²⁷ says, "The ossification of the carpus is generally entirely postnatal beginning in the early part of the first year and coming to an end shortly before puberty. Investigators differ considerably in their determination of the order and the date of ossification of the carpal bones." There appears to be a large amount of variation in both the time and order of ossification in carpal bones, even in normal children. Pryor's¹¹² results based on the study of 554 children show:

"The bones of the female ossify in advance of the male. This is measured first by days, then months, then years.

"The bones of the first child, as a rule, ossify sooner than those of subsequent children.

"Regardless of the variations (normal) the ossification is bilaterally symmetrical.

"Variation in the ossification of bones is a heritable trait." Figures 15-18 show the appearance of the carpal bones at one, two, three, and four years and the development of the epiphyseal bones.

Character of the Bones in Infancy.—The bones of the infant are much more spongy in structure than those of the adult. Toppich found that nearly 60 per cent of the bulk of the bony skeleton of the newborn is made up of material other than bone tissue. There is a reduction of porosity in all the bones except the vertebra during childhood.

In the child's skeleton there is a large proportion of cartilage and of fibrous tissue and the younger the child, the greater the proportion. It is this large proportion of cartilage that

gives the child's bones the comparative softness which renders them liable to deformity when subjected to unusual pressure or muscle pull. The size and shape of the feet of Chinese women of a previous generation, the unusual shaped head of certain African tribes and the bowlegs of the rachitic child, are examples of deformity due to pressure and muscle pull.

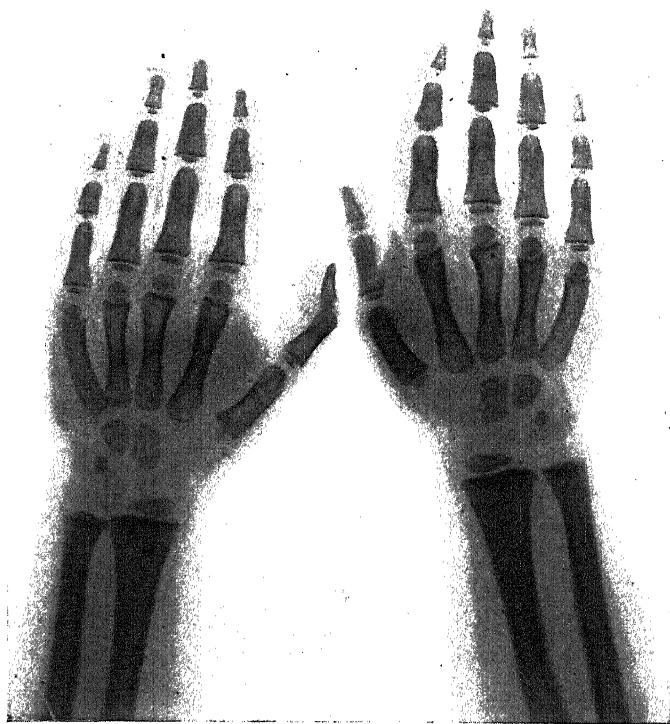


Fig. 17.—Bone age three years.

The bones of the child have provision made for growth either of the bones themselves or of the organs which they enclose. Bones of the skull instead of being firmly united to one another, as they are in the adult, are loosely connected by membranes, leaving considerable space between the edges. This allows for ample space for the brain to grow and develop.

Skull.—During early infancy all parts of the skull grow rapidly. The cranial capacity increases, according to Williams and Todd,¹⁸¹ from 350 cc. in the newborn to 600 cc. at six months, 1000 cc. at twelve months, 1100 cc. at two years. After twenty-four months, although continued, the growth is less rapid and less marked. The development of the skull is intimately associated with the growth of the brain, the eyeballs, the teeth, and certain of the large muscles.



Fig. 18.—Bone age four years.

Brain.—The average weight of the brain at birth is 350 Gm. (about 12 ounces). The male brain is about 20 Gm. heavier than that of the female, while the adult brain weighs from 1260 to 1400 Gm. One quarter of the weight of the adult brain is attained by birth, one half in the first nine months and about three quarters by the end of the second year and 90 per cent by six years. The growth of the brain is completed by the sixteenth to twentieth year. The brain of the new-

born is relatively heavy in comparison to the total weight of the body, the ratio being as 1: 10 while in the adult it is as 1: 40.

Spinal Cord.—The spinal cord at birth weighs about 3 to 3.5 Gm. being about one eighth of that of the adult. According to Pfeister* the weight of the cord is doubled in the first five months, trebled in the first year, and quadrupled by the beginning of the third year. The length of the spinal cord is from 15 to 17 cm. (between 6 and 7 inches). It doubles its length in the first ten years of life and almost triples it by maturity.

CHANGES IN DIGESTIVE TRACT

Saliva.—Studies to determine the amount of saliva secreted by infants have been difficult. The amount is small but that it is definitely present has been established. Quantities secreted during the first hour and a quarter of digestion vary from 8 to 25 cc. The salivary glands weigh approximately 2 Gm. at birth; they are said to increase approximately three times in weight during the first six months and five times during the first two years. The saliva of the newborn contains the digestive enzyme ptyalin in small quantities. The amount of this enzyme increases during the first year and by this time the composition is identical with the adult saliva. The reaction of the salivary secretion is neutral or slightly alkaline at birth, which is important because it determines the activity of the ptyalin and influences the bacteria which grow in the mouth.

Stomach.—Recent radiographic studies have modified earlier conceptions of the external form and position of an infant's stomach. Radiographs have shown that when the child is in an erect position the stomach lies transversely in the body rather than vertically as was previously thought. The capacity of the stomach of the newborn is at first very small, varying in individuals and according to the diet; its average anatomic capacity is a little more than 1 ounce (30 to 35 cc.). This is increased to 75 cc. in the first two weeks and is 100 cc. by the end of the first month. Scammon¹²⁷ says that it is "an established fact, however, that the healthy breast-fed

* Quoted from Scammon.¹²⁷

babe occasionally takes much greater quantities of food at one time than would seem possible, according to the capacity of the stomach, and it has been shown that part of the milk passes unchanged from the stomach into the intestine while the child is nursing."

Gastric Juice.—Gastric juice containing its characteristic enzymes, rennin, pepsin, lipase, is present at birth although varying in amounts with different individuals. Hess has been able to collect 8 to 10 cc. of highly acid secretion before any food had been given. Carlson²⁴ has demonstrated that the adult stomach produces a continuous secretion of gastric juice varying from a few cubic centimeters to 60 cc. per hour independently of any food or psychic reaction. The secretion present at birth is doubtless of this character.

Hess has shown that free hydrochloric acid which activates pepsinogen and changes it into pepsin is present in demonstrable amounts in the stomach of the newborn. Grulee⁵⁶ expresses some doubt as to whether the hydrochloric acid in the newborn is sufficiently concentrated for the action of pepsin although it may be sufficient for that of lipase and rennin. His investigations indicate that during the first month of life the acidity of the stomach remains nearly stationary during the first hour after a meal, increasing from then on until the next feeding. If the feeding is delayed for hours, the acidity may become as high as in the adult.

Absorption of food in the stomach of the very young infant is probably slight, the major part of the absorption being thought to take place in the intestine.

Time of Emptying Stomach.—The time required for the average healthy infant's stomach to empty itself depends on the quality and quantity of the food. The emptying time of the infant's stomach is influenced by a number of factors. One of these factors is the position of the child after feeding. Apparently the emptying time is shortest when the child is in a right lateral position (semi-erect) and longest when he lies upon his back. Some investigator also found that placing the child upon the right side hastens the emptying of the stomach. Other factors are considered important in their influence on the time of emptying the stomach. Among these are the

character of the food which has been taken and the activity of the pylorus. It is recognized that even the slightest disturbances may influence the motility of the stomach so greatly that food may remain much longer. Therefore the child should be quiet after feeding.

Air is always taken with the food, usually only a little, frequently enough to cause air block with its consequent vomiting, gas and colic. Smith and LeWald¹³⁷ found by *x-ray* examination that in a vertical position the stomach contents gravitate to the bottom and the gas can then be expelled through the cardiac orifice of the stomach. Thus scientific findings have justified the practice of mothers of laying a colicky baby over the shoulder and patting its back. In a recumbent position the opening into the esophagus becomes blocked by the food in the stomach and the accumulation of unescaped gas gives rise to distention of the stomach and pain, as well as causing pressure on the mucous membrane and blood vessels of the stomach and in this way interfering with gastric secretion.

Hunger.—Carlson²⁴ has shown that "The empty stomach of the newborn shows periods of gastric hunger contractions before the infant has had any experience with food. The hunger periods are more frequent in the infant than in the adult. In the newborn and very young infant, the quiescence of the empty stomach lasts from ten to sixty minutes; in the adult usually from one to three hours.

"This greater frequency of hunger in the child is shown by the more rapid development of the hunger period after a previous meal. In an adult (after a full meal) gastric hunger contractions do not develop for from four to six hours. If the individual is lying in bed the time is even longer. In the normal breast-fed infant the average time of appearance of a hunger period after a full meal is only two and one-half hours."

Intestines.—Concerning the length of the intestine Scammon¹²⁷ says that at birth it is quite variable but that this variation does not seem to be intimately associated with variations of body length or weight. The work of Scammon¹²⁷ and others indicates the length of the large intestine to be

at birth (average of 25 cases) 66 cm. and of the small intestine 338.5 cm. By the end of the first six months of life the large intestine has increased 4.7 cm. and the small intestine has increased 42.4 cm. In the next six months the large intestine increases 12.4 cm. and the small intestine 31.2 cm. During the second year of life the large intestine increases 5.8 cm. and the small intestine 42.3 cm. Between the second year and adult life the length of the large intestine increases 71.8 cm. and the small intestine 293.5 cm.

Scammon found that the intestinal tract increases about one third in length during the first year of life. Thereafter the growth is much slower. The most marked differences between intestine of the infant and of the adult is that in the infant the mucous membrane is more developed in proportion to the muscular layers than in the adult. The villi in the newborn are distributed the entire length of the small intestine as in the adult.

Pancreas.—The pancreas in the newborn weigh from 2 to 2.5 Gm. By the sixth month the weight has doubled. At the beginning of the second year it will weigh about 10 Gm. In the following two years this weight is often doubled.

Liver.—The liver in the newborn occupies nearly two fifths of the abdominal cavity and forms 4 per cent of the body weight—it weighs from 120 to 150 Gm. In the first year it more than doubles its weight. In the third year the weight has increased threefold. By the ninth year it weighs six times as much as at birth and by puberty it weighs ten times.

Digestive Secretions.—Authorities generally agree that the digestive changes in the alimentary tract of the infant seem to occur in the same manner as in the adult. All the enzymes and glandular secretion, also the hormones, prosecretin and secretin, which function in the digestive processes are present in the newborn, and for the most part, have been identified in the fetus. Recent research has proved that the proteins are split into amino-acids and peptids before absorption, disproving the earlier theory that some proteins of breast milk were absorbed unchanged. Milk sugar is not absorbed as such, but when given in quantities within the limit of digestion and absorption, is changed by enzymotic

action into dextrose and galactose. For more detailed information concerning the digestive system and digestive secretions, consult White House Conference Report, Part II, Sec. I, Physiology and Anatomy, pp. 423-436. It is conceded that the products of the digested food of the infant are absorbed through the whole gastro-intestinal tract, although actual data are more limited concerning absorption than in any other field of the physiology of digestion.

Kidneys.—Before birth the kidneys function little if at all. The kidneys of the newborn weigh 22.5 Gm. (about $\frac{3}{4}$ ounce). This weight is doubled in the first six months and tripled by one year, and increased fivefold by five years. Bean says that their growth parallels the periods of great physical and mental activity, and the increased alimentation of the body. The kidneys form about 0.6 per cent of body weight in the newborn as compared with 0.2 to 0.3 per cent in the adult. The bladder is almost entirely within the abdomen at birth and during childhood it descends into the pelvis. In early infancy capacity of the bladder is variously estimated from 40 to 70 cc. (about $1\frac{3}{4}$ to $2\frac{1}{2}$ ounces). There is a close relation between the quantity of water taken and the quantity of urine excreted. Sixty to 70 per cent of ingested water reappears as urine.

Quantity of Urine.—The urine, during the first few days of life, is scanty and concentrated, tallying with the small amount of fluid taken and the large water output from the lungs. The presence of relatively large quantities of uric acid and of albumen in infant's urine during the first and second weeks of life are, as indicated by Scammon,¹²⁷ not particularly harmful. The urine is voided, according to Scammon, about three times as frequently as food is taken, and if water be taken between meals, the voiding of urine may occur twenty to twenty-five times in the twenty-four hours.

Figures quoted by Feldman³⁶ show that a month-old child may void urine as many as thirteen times during a twenty-four hour period. The number of times urine is voided continues about the same during the first three months, increases to twenty times during the second three months and at the end of the first year the child is voiding urine on the average of

sixteen times. The number of times decreases to twelve during the second year and to ten during the third.

The quantity voided each time increases with age, the month-old child will void each time 34 cm. (about $1\frac{1}{4}$ ounces); the six- to twelve-month-old child will void 44 cm. ($1\frac{1}{4}$ ounces); the one- to two-year-old child 60 cm. ($2\frac{1}{4}$ ounces); the two- to three-year-old child 88 cm. ($3\frac{1}{4}$ ounces).

Feldman says: "The total twenty-four hour quantity of urine in an infant six months old is double that of an infant one month old. At four years old it is three times. This quantity, however, varies with a number of factors."

GLANDS OF INTERNAL SECRETION

"It goes without saying that many existing gaps in our knowledge of endocrine physiology in the prenatal and early postnatal period of development of the infant himself should be filled. In this case comparative physiology is only of suggestive value because of probable significant differences in sequence and extent of endocrine development in the human and in the lower animal bodies. The problem is thus rendered extremely difficult because, direct experimentation being almost impossible, we are largely reduced to morphological observations and these at best give only indirect evidence as regards details of physiological function. The possibility remains open, however, of studying more adequately than has yet been done the properties of extracts of various endocrine organs or human subjects at various early stages of development. The chief practical difficulty here lies in the fact that gland material for such studies must be collected from normal subjects very soon after death."*

Thyroid.—The thyroid gland is probably best known of the endocrine glands because of the pathologic effects (goiter or hypothyroidism) which are produced when its function is abnormal, either in overactivity or in deficient activity. The thyroid gland located in the neck just behind the windpipe is important because it secretes a hormone, known as thyroxin, which enters the blood stream and affects both metabolism and

* White House Conference,¹⁷⁶ Part II, Sec. I, Physiology and Anatomy, pp. 533-534.

growth. The lack of thyroid during the period of growth results in the failure to grow normally in stature. Not only is there a retardation in height but the arms and legs are relatively short. The physical proportions of the cretin still simulate those of the newborn infant. This is true not only of skeletal growth but also of mental. Deficiency in thyroid secretion may affect an individual in a number of ways. Some mainly showing themselves in the growth processes, others affecting the individual at all ages. The deficiency may affect the growth of the skeleton, dentition, growth and functions of organs, metabolism, the endocrine glands and the growth and development of the brain.

Pineal.—The pineal body is a structure shaped like a pine cone attached to the dorsal surface overlying the third ventricle of the brain. In the human adult it is approximately 160 cu. mm. in volume and is relatively somewhat larger in children than in adults. Such knowledge as we have of the function of the gland has been derived from studies on gland feeding, gland extirpation and postmortem examinations. The evidence now obtainable is paradoxical and stands as a challenge to further investigation. Such evidence as is available suggests that the gland may produce a hormone which serves to stimulate development and to accentuate the changes characteristic of puberty.

Suprarenals.—The suprarenal glands are paired organs lying at the anterior poles of the kidney. Each adrenal consists of two distinct parts, the cortex and the medulla, which differ in their embryonic origin, functions and chemical composition. The adrenals vary in size rather markedly under different conditions. During the fetal period instead of the usual progressive growth common to other organs there is an extremely rapid development in the third month when the organs reach their greatest relative size. From this time on they decrease relatively until in adult life they constitute only one hundredth of 1 per cent of the total body weight. In certain cases in both children and adults where the masculine characteristics are definitely accentuated the adrenal cortex is found to be relatively large. Relatively little is positively known regarding the relation of adrenals to growth and de-

velopment and regarding the functional interrelation between them and the other endocrine organs. Hammett's* studies indicate an intimate correlation of the adrenals with other endocrine glands. Of these facts we are reasonably sure that the adrenal glands are essential to life, that the vitally necessary part is the cortex. "Whether the medulla plays any part in normal conditions of quiescent existence is doubtful, though absence of an influence is by no means proved. It plays a definite and probably an important part in accentuating the activity of the sympathetic nervous system in times of special stress."* The masculinizing effect of hyperfunction of adrenal cortex is striking.

Pituitary.—The pituitary gland or hypophysis lies on the underside of the brain and consists of an anterior and posterior lobe. It, like the thyroid gland, is best known by the disease produced when its normal function becomes changed. The evidence obtainable from deficiency experiments indicates that the posterior lobe is concerned with fat metabolism, water metabolism, heat regulation, and possibly sleep, and the effect of deficiency of the anterior lobe are disturbances of growth and of the sex functions. The most definitely characterized pituitary diseases now recognized are those related to disturbances of the growth hormone of the anterior lobe, namely, gigantism, acromegaly and dwarfism. The above-named disorders are only a few of the various physical disturbances in which the pituitary gland is involved, but "our ignorance of clinical endocrinology as pertaining to this gland is more striking than our knowledge."† Further study on primates and human beings is necessary to reveal the function of the glands and their effect on normal growth and development and the part they have in producing disease.

Parathyroids.—The parathyroid glands are four tiny glands whose total weight is about 0.5 Gm. and, typically, the superior parathyroid in man lies on the medial dorsal surface of each thyroid gland at about the junction of its upper and middle thirds. In some instances they are more or less buried in

* White House Conference, Part II, Sec. I, Physiology and Anatomy, p. 555.

† Ibid., p. 570.

the thyroid substance and are referred to as internal parathyroids. The parathyroids have a highly important function in the regulation of calcium and phosphorus metabolism. The outstanding results of parathyroid deficiency are a marked drop in blood calcium, increase in blood phosphorus and increased excitability of the neuromuscular system. The alteration in normal blood calcium and phosphorus would produce skeletal and dental disturbances which would affect normal development.

Sex Glands.—The testis at the time of birth has migrated to its final position in the scrotum. The testes, of which there are two, produce a true masculinizing hormone. The hormone apparently begins to function in a minor degree before birth, but it becomes markedly manifest at puberty. The testes are interrelated functionally with most, if not all, of the endocrine glands. These exact relationships of testes to other endocrine glands are in need of further study. Deficiency of testes in their function results in hypoplasia of the thyroid, delay in thymic involution, and overconcentration of the sex-stimulating hormone in the anterior lobe of the pituitary.

The *ovary* is also a gland of internal secretion. There are two. At what stage they begin to function as organs of internal secretion is not yet clear. With the onset of puberty it is definitely known that two internal secretions are produced containing two distinct hormones, the follicular fluid (folliculin) and the corpus luteum (progestin). An active principle similar to that of follicular fluid can be obtained from the amniotic fluid, the placenta, the blood and the urine of pregnant women. To what extent this originates in the ovary remains to be determined. The follicular hormone induces premature puberty, stimulating the entire genital tract and the mammary glands. It restores the estrum (menstruation cycle) and serves to correct the genital atrophy that follows ablation (removal) of the ovaries. It is probably of considerable importance as a conditioning factor in human psychology. The corpus luteum likewise stimulates the mammary glands and promotes various changes in the genital tract preparatory for pregnancy.

The ovary is functionally related to the thyroid, the pitui-

tary, the pineal, and the thymus and the adrenals. There is also a relationship with all the other endocrine organs because of the intervention in bodily metabolism which in turn influences ovarian activity. Many problems in ovarian physiology remain to be solved and further experiment will throw further light on their relation to growth and development.

INCREASES IN HEIGHT AND WEIGHT

Increases in Height.—According to the United States Children's Bureau Standards,²⁹ based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing (the children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native, one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock), boys under one month have an average height of $21\frac{1}{8}$ inches and girls at the same age have a height of $20\frac{7}{8}$ inches. The boys at nine months have grown $7\frac{1}{8}$ inches and the girls $6\frac{3}{4}$ inches. The rate of increase is indicative of the rapidity with which the baby's body is developing and in a certain sense an index of how satisfactorily growth is proceeding.

It is always to be kept in mind that the rate of growth varies widely for different children and no standard exactly fits the individual. Many physical conditions may influence the rate of growth so that, at best, standards based upon average measurements are intended to serve only as guides to indicate what seems fair to expect of well, healthy children.

Increases in Weight.—Even more marked than the baby's increase in height is the increase in his body weight. During the first six months the average well child will double its birth weight. The United States Children's Bureau standard shows that the boys who measured 21 inches had an average weight of $9\frac{1}{2}$ pounds and girls of the same height weighed $9\frac{1}{4}$ pounds. Boys of 26 inches height or five inches taller than the 21-inch child, weighed $16\frac{5}{8}$ pounds, and girls of 26 inches weighed $16\frac{3}{8}$ pounds. When a height of $28\frac{1}{4}$ inches has been attained, the boys' average weight is $19\frac{11}{16}$ pounds and girls' weight is $19\frac{5}{16}$ pounds. It must also be remembered that the rate of gain in weight

for all children is not the same and at best these figures serve only as a general guide.

According to statistics compiled by the Iowa Research Station, boys at one month will average in height $21\frac{1}{2}$ inches and weigh 8.6 pounds; girls at the same age will average in height $20\frac{2}{5}$ inches and weigh 8.1 pounds. The boys measured by the Iowa Research Station will average $\frac{3}{8}$ inch taller and slightly less than 1 pound lighter than Children's Bureau Standards. The Iowa figures show the increase in height at the ninth month has been $6\frac{7}{10}$ inches for boys and $7\frac{4}{10}$ for girls, which for the boys is a little below the Children's Bureau Standards.

SUGGESTED QUESTIONS

1. What difference does it make whether or not you believe that education is limited to the school room?
2. How much should you cuddle and handle a young infant?
3. Add to the list of playthings desirable for young babies.
4. Select for observation some baby of less than nine months of age. Do you think he is developing normally? Defend your judgment.
5. Discuss the desirability of "showing the baby off" to visitors, especially at meal time, bath time, and going-to-bed time.
6. When should the baby begin to make acquaintances of people other than his mother or nurse? Who should these acquaintances be? Under what circumstances should he meet them? Should he ever be left alone when he is awake?
7. Why is it desirable to talk to an infant while he is playing or bathing? Is it a good idea to chatter to him during the feeding or toilet period? Why not?
8. What knowledge of the infant's digestive tract is necessary in order to feed him intelligently?

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CHAPTER III

CARE AND FEEDING OF THE BABY

THE BABY'S RÉGIME

The Importance of Establishing Regular Habits.—It is obvious that to meet a baby's needs there must be a daily régime which differs greatly from the régime of independent adults or even of older children. The hours of eating and sleeping are different. The complete dependence of the baby demands the service of others for what may easily seem countless things in the course of a day, and night may even sometimes seem to be turned into day. Too easily may the youngest member of the household come to be the small tyrant for whom everything gives way and around whom the whole family revolves and by whom the whole family schedule is disrupted. But such a state of affairs should not be allowed to exist and need not if the schedule for the baby is planned and adhered to and is made to fit into the essential family routine. A schedule strictly adhered to is of utmost importance. The animal organism seems to be built on a rhythmical pattern; the heart beats according to a certain rhythm, breathing goes on rhythmically. Human beings live rhythmically and the baby needs to begin immediately to live his life according to a certain rhythm. Not just food at certain intervals but food every day at the same time. A baby who lives according to a schedule to which he perhaps unconsciously but doubtlessly physiologically becomes accustomed does not have the sense of insecurity about his care that the baby who is daily subjected to a different scheme invariably has.

Sleep.—*Activity and Rest.*—It is essential to maintain a proper balance between activity and rest, between waking and sleeping. The young infant's business in life is to grow, and without sufficient sleep and rest this is impossible. The newborn sleeps the greater part of the twenty-four hours, or at

least practically all the time when he is not being nursed, bathed or having other necessary attention. In fact it often seems difficult to keep him awake long enough to attend to his physical needs. At six months the infant whose horizons have widened and whose environment has begun to speak more meaningfully to him is spending much more time awake and is possibly sleeping fifteen or sixteen hours. At one year, as Table I on Hours of Sleep indicates, the average child

TABLE I
HOURS OF SLEEP*

Age.	Shortest sleepers (Lower 10 per cent).		Average child.		Longest sleepers (Upper 10 per cent).	
	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.
1 mo. to 6 mos.	13	00	15	3	16	40
6 mos. to 1 yr.	12	12	14	9	15	40
1 yr. to 1½ yrs.	11	50	13	23	14	33
1½ yrs. to 2 yrs.	11	47	13	6	14	00
2 yrs. to 3 yrs.	11	22	12	42	13	30
3 yrs. to 4 yrs.	10	53	12	7	12	59
4 yrs. to 5 yrs.	10	31	11	43	12	28
5 yrs. to 6 yrs.	10	14	11	19	11	56
6 yrs. to 7 yrs.	10	2	11	4	11	34
7 yrs. to 8 yrs.	9	53	10	58	11	29

* Stuart,¹⁴ H. C., "Healthy Childhood," D. Appleton-Century Co.

is sleeping fourteen hours, nine minutes. Children's sleep needs vary somewhat and no one should allow a behavior problem to develop through trying to force a child to sleep the number of hours stated in some books as the necessary amount of sleep for a child of a given age.

The infant sleeps very quietly; the older child is usually more restless, although during the midperiod of his sleep he may lie very quietly. In those periods in sleep when the child lies quietly, sleep is more nearly effective rest than when the child continues physically active although asleep.

The infant falls asleep readily and sleeps quietly. "Sleeping like a baby" is a simile used wishfully by adults as a goal which few of them can reach. A baby, comfortable in body, with none of the worries which may be inhibitory to the sleep

of an adult, has two of the chief requisites for refreshing sleep. It is therefore most important at this time to establish and maintain good habits of sleep. Satisfactory conditions for sleep and a regular routine of preparation for sleep will aid in developing these habits. The baby should not be stimulated and played with just before it is expected that he will settle down for the night. The windows should be opened in the room in which he is sleeping, but the wind should not blow directly upon his bed. If the temperature is in the neighborhood of zero it is desirable to limit the amount of fresh air admitted, since it is difficult to keep infants warm without using an excessive amount of bedclothes.

Physical Exercise.—Physical exercise for an infant is very different in kind and degree from that for an adult. A baby lying on his back and kicking is having strenuous exercise for him, and he should be given an opportunity every day for exercise. He should lie part of the time on his stomach as in this way he gets good exercise in lifting his head and pushing himself up from the bed. To sit up, to stand, to walk require for the young child a real expenditure of energy. A reasonable amount of exercise will stimulate the muscles, ligaments, and bones, but overstimulation and overexercise is to be guarded against. Exercise is conducive to a good appetite and to sound sleep. When it is carried to the point of fatigue where recuperation is difficult it may do harm to the child. This is especially true of nervous fatigue. Often parents are very proud of their child and wish to show off his accomplishments. This leads to forcing children to do things before they are ready or for too long a period of time. Often, also, the presence of an older brother or sister in the family stimulates the baby to try to do what is beyond his skill and ability. A young child is excited by many things which seem unstimulating to us, such as a large variety of toys, constant amusement, automobiling, continuous hilarity about him. This excitement, in turn, induces fatigue which may later bring about detrimental physical results.

A child should spend as much time as possible *out of doors*. The number of hours which he can spend out of doors will depend on the climate and the season of the year. If the sun

shines the child should be placed in it for at least a short time each day so as to get the benefit of the ultraviolet rays. The eyes of a baby should be protected so that the sun does not shine directly into them.

Elimination.—As has been said, the breast-fed baby has from 2 to 4 movements a day of a golden yellow color. Bottle-fed babies, as a rule, have fewer movements than breast-fed babies and the stools are characteristic of the formula given. The normal stools of milk-fed babies turn green on standing. This must not be confused with the diarrhea stool. It must be remembered, however, that there is no absolute rule as to the number of stools a baby should have in the course of twenty-four hours. Babies seem to develop their individual rhythms and for one baby a movement after each feeding may be normal. For another, only 1 movement a day may be normal. If the baby is happy, gaining, eating and sleeping well, and if the character and number of stools are fairly constant, the actual number per day is unimportant. But if the baby changes in behavior, if the character and number of the stools change, there is evidence of some disturbance to which the adult caring for the baby must give heed.

A rhythmic contraction of the intestine, called peristalsis, moves the food along the intestinal tract during the process of digestion. If the food is moved along too slowly the baby is constipated; if too rapidly, diarrhea is the result. The character and quantity of food are usually determining factors in constipation. Underfeeding may cause constipation, or a lack of sufficient carbohydrate may be a cause of constipation, as sugar is a food which stimulates peristalsis. The right food is therefore of prime importance in treating constipation in infants and one should not resort to laxatives except under a physician's order.

Diarrheal stools are frequent in number, green in color, watery and have a large increase in the amount of mucus. The increase in peristalsis, which results in diarrhea, may be due to an infection or to an irritation due to the food. It should be reported to a physician immediately, as the underlying cause should be sought and removed.

Training.—When a baby can be held fairly comfortably

over a small chamber in the adult's lap, it is possible to begin toilet training in regard to the stool. The time when the movement tends to occur can be noted and at that time the baby can be held for a few moments over the chamber, but the baby must be held comfortably and not too long lest the experience set up an antagonistic attitude toward the toilet because of the discomfort.

Training for reliability in regard to urinating might well be begun before one year. Babies may be reliable about this matter in the day time by the time they are eighteen months old, but many are not and the mother should not allow a sense of discouragement or irritation to affect her attitude in the matter. Histories taken in regard to toilet training of many nursery school children indicate that serenity and system on the part of the mother are two of the most important factors in the situation. Irritation, punishment, worry, anything which has upset the serenity of the relationship between the mother and the baby hinders rather than helps toilet training. The point should also be made that a baby who has had the comfort of being regularly changed and therefore nearly always dry has certainly a sound foundation laid for toilet training.

EQUIPMENT NECESSARY FOR THE BABY

Crib.—The things needed for the baby may mount high in cost or be obtained at a minimum of expense. He needs a bed by himself, for example. It may be an expensive bassinet or a straight-sided clothes basket. Either will serve the purpose. One wishes to keep the things about a baby as clean and hygienic as possible. The important point, therefore, is to select something that can be easily kept clean by being washed. If a crib is to be bought it is well to remember that the baby will grow and the economic thing is to buy a larger rather than the smallest size. There needs to be a bureau or, at least, some drawers in a bureau, where the baby's things may be kept.

Clothing.—Although the baby should be dressed as simply as possible there must be a sufficient number of each garment to allow for plenty of changes. Dr. Slemons in his book, "The

Prospective Mother," says, "In preparing clothing for the newborn, several principles must be kept in mind. The first is that the garments must be warm without being unduly heavy; and another that they should be roomy, permitting perfect freedom of motion. A third no less important principle is simplicity. Adornment of the clothing gratifies the mother, but does not serve a single useful purpose."

No two lists of baby clothes will be found to be alike, but Carolyn Van Blarcom¹⁶⁰ in her book, "Getting Ready to be a Mother," gives the following list of clothes as adequate for meeting the baby's needs.

"Two to 4 dozen diapers, about 18 inches square.

"Three flannel bands, 6 inches wide and 27 inches long, unhemmed.

"Three knitted bands with shoulder straps.

"Three shirts, infants' size 2, of cotton and wool, silk and wool, but not all wool.

"Four wool and cotton flannel petticoats.

"Four wool and cotton flannel nightgowns.

"Six thin white cotton slips or dresses.

"Flannel wrapper or a yard square of flannel for extra wrap in cool room.

"Cloak and cap, or other wrap for outdoor use in cool weather."

The unhemmed flannel bands are used for the newborn baby until the cord has come off and the umbilicus healed. Many today use only the shirt after this and no knit band. Some women have more than 4 flannel nightgowns, and for some time do not attempt to dress the baby in petticoat and dress. Others use a dress and no flannel petticoat. Since newborn babies sleep much of the time, dresses or slips are not really essential and if one garment suffices it simplifies the dressing of the baby and reduces the washing.

Care of Diapers.—There should be a special drawer or box for diapers, and additional provision for the wet diapers until they are washed. A galvanized iron pail seems to be a satisfactory receptacle for caring for them. Soiled diapers should be freed immediately of any fecal matter by holding them in the flushing toilet in cold water. If this does not suffice to get

rid of all fecal matter a short, stiff brush will remove the rest. After such care they are ready to be washed with the wet diapers. The proper care of diapers is a simple matter and need not be disagreeable if properly attended to. Diapers wet with urine, no matter how small the amount, should never be dried and then used again. The regular washing in hot suds and water at a certain time each day of all the diapers makes this inevitable task a fairly simple one.

Equipment for Bathing the Baby.—In doing the necessary things for a baby, it is usually more comfortable to sit in a low chair so that one's lap will be as flat as possible. This chair should, of course, be without arms. Many hospitals, however, today teach their nurses to do everything for the baby as he lies on a table which is high enough so that they do not have to bend to their task. Mothers often provide themselves with tables which are indeed convenient although not essential. If one's bathroom is small and one bathes the baby in the bathroom, it is not always easy to introduce this piece of furniture, in which case the mother must dress the baby in her lap.

The bath tub may be of rubber, which is more convenient because it is collapsible and light, or it may be tin or enamel. The rubber tub may be on its own stand or it may fasten to the sides of the regular family bath tub. The tub may have a canvas cover attached with hinges which will serve as the table. But whatever the equipment it should be at the right height for the mother to work easily without bending over, which is the point to bear in mind. A tray with the necessary toilet things all gathered together in one place, a bath apron of two thicknesses, rubber or stork sheeting covered with flannel, or some soft absorbent material such as Turkish toweling, which is kept with the tub, all help to make the matter of bathing the baby as simple and expeditious as possible. To dry a baby after the bath one must have towels of a soft absorbent material with which to pat the baby dry rather than rub him. The wash-cloths should be small and soft, several thicknesses of cheesecloth quilted together make soft wash-cloths for babies.

It is most interesting and satisfactory to have scales in one's

home in order to watch the baby's weight, but it is useless to buy scales unless one buys reliable ones.

The whole matter of equipment for a baby is not a definitely standardized one and from time to time different things are advocated. The various books on infant care give lists which differ in details although they are similar in general. The main thing to remember is that one must have the things necessary to provide for the baby's sleep, rest, nourishment, and elimination, and to facilitate his bath and dressing. The doctor and nurse who are to give a woman care often have things to suggest which they think are especially satisfactory, and it is well to get advice from them on the subject.

Gathering the equipment and clothing for the baby and planning the room may be made a matter of great interest to the family, to parents and children alike. The father may do his share, particularly if he can do a bit of carpentering, as some of the equipment may easily be homemade—cribs, and pens, and bathing table, for example.

THE BABY'S FOOD

Advantages of Breast Feeding.—Human milk is the natural food for babies. Statistics show that the infant mortality rate among breast-fed babies is lower than that among artificially fed babies, due probably to the fact that breast milk contains properties which help the baby to resist disease as well as to the fact of having the right combination of food elements. Advantages of breast feeding are enumerated by Stuart¹⁴⁴ as follows: "Breast feeding is the natural method of providing food for the newborn infant. It is no longer the only successful method, as it was not many years ago, but it is still the best method for the greater majority of infants during their first six or eight months of life. Breast milk is physically and chemically a better food for young infants than cow's milk. The chief physical advantages of breast milk are the smaller and softer protein curds which form from it in the stomach, the smaller fat globules which it contains, and the shorter time which the stomach requires to digest and pass it on to the intestines. The chemical advantages of breast

milk have to do with the nature of its proteins, the amount of digestive acids needed to utilize these proteins, and the relative amounts of fats, carbohydrates and protein which it contains. In addition, breast milk has the advantage of passing directly from the mother's breast into the baby's mouth, without any possibility of becoming contaminated. This is a most important consideration; for a very large proportion of the nutritional upsets which occur in infants is due to bacterial infection, acquired from contaminated foods. Strict precautions in the collection and distribution of milk and in the preparation and feeding of the formula will minimize the likelihood of such infection, but it always remains as an extra hazard associated with artificial feeding. Finally, breast milk has the advantage of coming ready-made, and, hence, does not require the careful prescription and preparation which formula feeding does." One would wish, therefore, that a baby should have the opportunity of having some breast milk for at least six or eight months.

Composition of Breast Milk.—The average composition of breast milk is sugar 7.5 per cent, fat 3.5 per cent, protein 1.25 per cent, mineral salts 0.25 per cent, water 87.5 per cent. But there are individual variations and some modifications may apparently be effected by changing the mother's diet and amount of exercise.

While the scientific literature is filled with data concerning the lactation of animals, especially the cow, comparatively little may be found in regard to those factors influencing lactation in women. Very little scientific knowledge on the optimum conditions for producing mother's milk has been obtained, either through metabolism experiments or by observations.

Meigs' Review of Factors Affecting the Quantity and Quality of Milk in Animals.—Meigs⁸⁹ has presented a very complete review of the literature which reports experiments on animals where the milk yield was studied while changes were made in the food. In the first place, changes both in the quality and quantity of protein fed have been shown to affect the total milk yield, and in some cases to slightly affect the concentration of protein. Moreover, changes in the quan-

tity of the total ration seem to affect the total milk yield. On the other hand, carbohydrate metabolism, as indicated by the level of the blood sugar, seems to have very little to do with the secretion of milk. Fat metabolism, as well as the phosphorus content of the diet, may affect the milk fat. The milk phosphorus is not affected by the phosphorus content of the fat. Furthermore, the calcium of the blood plasma of the mother is the precursor of milk calcium; therefore, not the diet of the mother as much as the calcium stores in her own body may be drawn upon to furnish calcium for the milk.

Various factors affect the quantity of milk secreted. Macy and Outhouse⁸⁵ have shown that a reduction of liquid intake, failure to empty the breasts completely at given intervals, and overwork have a tendency to lower the quantity production.

Stimulants to Milk Production.—Certain compounds have been reported to be galactagogues or stimulants for the production of milk during lactation. None of these substances have been definitely proved to be of positive value. One of these, malt extract, 1 tablespoonful of thick malt extract being taken three times a day, may be efficient because of its vitamin B (B_1 , B_2) content rather than any specific drug effect.

According to some "tales" tea is a galactagogue and is advised by women and taken in large quantities during lactation. Without doubt, high liquid intake during this period is advisable. However, the action of tea, as a specific stimulation to milk products, has no foundation in scientific experiment. Milk, sometimes advised by women, however, is quite different from tea and similar substances in its value during lactation. Milk is valuable as a food component in the diet not only in the effect it may have upon the milk of the mother, but also in its "building power" for the maternal tissues. It is a most economical source of calcium as well as being valuable for other food components, especially protein. Hoobler⁶⁵ found that as a source of animal protein in the diet, cow's milk was best suited for the preservation of the maternal tissue and the production of milk protein. Hoobler has given the following distribution of sources of protein in the diet as desirable:

Cereal.....	60.5 per cent of total protein
Vegetables.....	14.2 per cent of total protein
Fruit.....	1.4 per cent of total protein
Milk.....	23.9 per cent of total protein

Hoobler has also reported from observation of lactating women that an animal protein diet produces milk higher in calories and nitrogen and keeps the mother in positive nitrogen balance better than a vegetable protein diet. Diet probably is the best galactagogue that is known at the present time. Regardless of numerous investigations, the evidence is inadequate to indicate the value of drugs as galactagogues. Atropine or pilocarpine have an effect on the mammary secretion which is neither constant nor marked. Tissue extracts and internal secretions, such as pituitary extract and corpus luteum, may result in a temporary increase in milk secretion, rarely lasting more than twenty-four hours, frequently lasting only ten minutes. Extracts of placenta, fetus, adrenals, thyroid, ovaries, all give varying results and therefore cannot be definitely recommended as galactagogues. Therefore, until more definite data are obtained, diet and stimulation of the mammary glands must be emphasized as the best galactagogue.

Adequacy of Breast Milk as a Food.—McCollum⁸³ has questioned the tendency to dogmatically accept human milk as the perfect food—the tendency to take for granted that whatever milk is produced by the mammary glands is necessarily of good quality. “There can no longer remain any doubt that human milk has been overrated with respect to its food value. Recent researches show clearly that it is not necessarily a perfect food. The quality and the quantity depend, in the human mother as in other species, in great measure on the nutritive condition of the lactating woman.”

Macy and Outhouse have shown that breast milk varies greatly in quality and may fall short of meeting the requirements of an infant. Although the infant may not die as a result of inadequacy in his mother's milk, his growth and development may fall definitely below the optimum. They have also shown that the milk from the same individual may vary considerably from time to time. Carefully controlled work on the feeding of young rats with human milk from

women who were under supervision showed that human milk is not always adequate in vitamin content, due to the deficient intake in the woman's food. These same investigations showed that milk from women on the average American dietary is a relatively rich source of vitamin A, a comparatively poor source of vitamin B, and very low in its vitamin D content.

The ideal for all infant feeding is to approximate insofar as possible the optimum food for a growing infant. Sometimes a modified cow's milk formula is superior to mother's milk. A point worth considering, however, is that if even part of the time and effort which is at present devoted to the study and practice of artificial infant feeding be applied to the conduct of maternal nursing, more infants could be nursed and nursed longer on breast milk than is now the rule.

Technic of Breast Feeding.—The care of the mother's nipples during pregnancy and after the baby is born is given to prepare them for nursing and to protect them against an infection which might follow a cracked or sore nipple. If a nipple does crack in spite of care it will probably be necessary to use a nipple shield. As has been said, the baby's sucking at the breast stimulates the mammary glands to action and by the third day the baby is probably getting milk from the breasts. Within two weeks the amount secreted in a day should have increased to at least a pint if the baby is to get enough and later a quart will be necessary to supply the baby's needs, although much more may be secreted.

The mother lies slightly on her side to nurse the baby, the right or left according to the breast to be used, and the baby lies in the curve of her arm. Usually alternate breasts are used at each feeding. The baby should get the nipple well back into the mouth, taking in not only the nipple but the areola around the nipple if good suction is to be attained. The mother grasps the breast with the thumb and forefinger of the opposite hand and so keeps the breast from pressing against the baby's face thus obstructing his breathing. The baby should be kept from sleeping during the feeding and if this is done he probably gets all he needs in ten or fifteen minutes and from one half to three fourths of what he needs in the first five minutes. He should not be allowed to nurse too fast but

should have the nipple removed from his mouth once or twice for a rest. He should not be kept at the breast more than twenty-five minutes. A baby who wants to stay at the breast longer than that is probably not getting enough to eat. After feeding he should be held up against the shoulder for a moment or two and his back patted so that he may expel any air he may have swallowed.

Intervals of Feeding.—Physicians vary as to the intervals of feeding but the tendency now is to have longer intervals between feeding than formerly. The four-hour interval gives longer periods of rest to the mother, the three-hour interval means more frequent stimulation of the mammary glands. If the baby is on a three-hour interval, there are usually 7 feedings in the twenty-four hours and if on a four-hour interval, 6 feedings, as one night feeding is omitted. Within a few weeks a second night feeding may be omitted and if the baby gains well and sleeps well the late evening feeding may be omitted and the baby be allowed to sleep from six to six. The fact is that each baby must be considered individually and a schedule worked out that seems to promote the well-being of the baby and the mother. In twenty-four hours the baby should take from $2\frac{1}{2}$ to 3 ounces of fluid for each pound of weight, the average baby needing about 3 ounces. The total amount needed should be distributed evenly between the number of feedings in the twenty-four hours. This, of course, can be done accurately in cases of artificial feeding. To get a fair estimate of what a breast-fed baby gets at a feeding the baby may be weighed before and after feeding. A baby's stomach at birth has a capacity of about 2 ounces but as the liquid is constantly leaving the stomach and passing on into the intestines it does not mean that he can take only 2 ounces. The amount which a baby should have at each feeding depends on several things, such as his age, his weight, the number of feedings in the twenty-four hours and his general vigor. He should have enough to make him satisfied and content after the feeding and not so much as to distend his stomach.

Diet of Lactating Mothers.—In referring to recent research in scientific nutrition, McCollum⁸³ makes the following state-

ments, "A study of the data makes it apparent how dependent the nursing mother is on the character of her diet as regards the quality of the milk which she will produce. When her diet contains proteins of high biological value, an abundance of the vitamins, inorganic elements in proper amounts and a source of energy in the form of carbohydrates and fats, she produces a milk which will induce optimum gains in the weight of her young. In just so far as her diet falls short in containing these essentials will the quality of her milk be reduced. The nursing mother cannot, except in a very limited degree, put into her milk from *her bodily reserves that which she does not receive in her food supply*. It is, therefore, of the greatest importance that the pregnant and nursing mother have a highly satisfactory diet in order that there shall be no shortage of the dietary essential in her milk supply."^{*}

According to Wilcox¹⁷⁹ most types of hypo-alimentation (underfeeding) of the nursing infant relate themselves to improper management of the life and the habits of the mother. It has been estimated that for every calorie secreted as milk, another calorie must be available for the work of secretion. Therefore, to a woman's required diet as an adult of a certain weight doing light work, there will have to be added twice the number of calories represented in her milk if she is to have a good supply of milk and maintain herself. It has been shown that although the child may be gaining, the mother may be losing and therefore, due to inadequate diet may be drawing upon her own tissues for nursing. When both mother and child are losing weight it may be that the mother's metabolism is unable to meet the extra demands of lactation.

Kennedy and Dutcher⁷³ say that the diet of the mother determines the amount of vitamins A and B in human milk. Available information also indicates that lactation and reproduction are most successfully attained when the maternal diet is generously supplied with adequate quantities of vitamin B. Four to five times the amount of vitamin B necessary for growth is necessary for lactation. It is established experimentally that the diets of lactating mothers should contain generous supplies of other vitamins as well as vitamin B (B₁, B₂).

^{*} Italics ours.

In discussing the effect of underfeeding upon lactation, McCollum⁸³ says there are "several factors which influence the effects of underfeeding, *e. g.*, the stage of lactation, the degree of underfeeding, the character of the ration, the state of the flesh of the animal, the plane of nutrition of the animal previous to underfeeding and the length of underfeeding."

McCollum cites through personal communication the observations of Maxwell and Miles in China that osteomalacia (softening of the bones with much less than normal amount of calcium) was especially prevalent among women who have borne children. The poverty of the people results in great restriction of the diet almost exclusively to cereals with little sunlight or exercise. According to McCollum the fact that rickets frequently occurs during the nursing period emphasizes the fact that breast feeding has its limitations in safeguarding the infant's health, and that proper feeding of the mother at this time is as important as breast feeding itself.

In describing the condition of nursing female rats on low-calcium diets, McCollum⁸³ says, "even though the animals did not present any abnormal appearance, as is frequently the case on low-calcium diets, they were, nevertheless, in a state of great nutritional instability"—described as low vitality, nervous, apprehensive, unsteady, and tottering gait—furthermore, he states that "this condition did not usually appear while the females were nursing their first litters, but after the second litter had been nursed for about fifteen to sixteen days the symptoms usually appeared." The young did not develop normally on the low-calcium diets even though the mother sacrificed much from her skeleton and tissues. The parallel of such animal experiments may be found in the nursing mothers who do not include in their diet foods, such as milk and eggs, which are satisfactory sources of calcium and phosphorus.

The ration for a lactating woman should be made optimal. The importance of adhering to such a diet may be emphasized by quoting Macy and Outhouse—"The adherence of women throughout pregnancy and lactation to dietaries rich in fruit, vegetables, dairy products, glandular tissues, and the like,

together with the early presentation of vitamin carrying foods to the infant, serve as the most potent factors in the production of a nutritionally stable child."

Substitutes for Breast Milk.—In spite of every effort made by some women to produce a quantity and quality of breast milk which would be right for their babies there are a few women who seem unable to nurse their babies at all and others who can only nurse for a short time. This means that babies must be artificially fed either wholly or in part. For the encouragement of such women, it should be said that the knowledge of how to meet the nutritional needs of babies has increased to such an extent during the last twenty-five years that one need not dread bottle feeding today as one would have twenty-five or even fifteen years ago.

The White House Conference Report¹⁷⁶ says of substitutes for breast milk: "With the help of modern methods, artificial substitutes for breast milk can be made and safely employed, which are in most respects satisfactory and in most cases insure normal growth and development of the infant. They are usually made with cow's milk, but for certain special therapeutic purposes are made without milk of any sort. Artificial feeding always demands the strictest attention to bacterial purity and close observation of the individual infant's requirements. The direction of artificial feeding should be in the hands of physicians expert in such work. When these requirements can be fully met, bottle feeding lacks most of the hazards commonly imputed to it. In most rural districts, however, and in many urban families of the middle and lower social and economic groups, these requirements are met with very great difficulty. For these groups, at least, it is of importance that breast feeding should be encouraged and every means available used to foster and continue it for as long a time during the first nine months of life as possible. If the supply becomes inadequate a mixed feeding, part breast and part artificial, is to be preferred, under these less advantageous economic or social conditions, to weaning at an early age. The tendency to wean at an early age illegitimate infants or those whose mothers, because of

economic pressure, feel the necessity of going to work, should be discouraged."

The technic for breast feeding is much simpler than for artificial feeding for in breast feeding the supply of milk is always fresh and sterile and the only precaution necessary is the bathing of the nipples before feeding. If a baby is to be artificially fed the purity of the food supply must be ascertained and the method of keeping it, preparing it and giving it to the baby must be such that there is the least possible opportunity of its becoming contaminated.

The usual substitute for mother's milk has been cow's milk although other animal milk is used from time to time in special cases. The composition of cow's milk differs from human milk as Table II shows.

TABLE II*

COMPARISON OF THE CONSTITUENTS OF COW'S MILK AND HUMAN MILK
Percentage Composition of Cow's and Human Milk

	Cow's.		Human.		Calories.	
					Cow's.	Human.
Protein.....	3.41	3.2	1.0	1.52	21.3	7.4
Fat.....	3.65	3.9	3.0	3.28	49.8	43.9
Carbohydrate.....	4.81	5.1	6.4	6.50	28.9	48.7
					100.0	100.0

	Fat, per cent.	Sugar, per cent.	Protein, per cent.	Salts, per cent.	Calories, per ounce.
Cow's milk.....	3.5-4	4.5	3.5	0.75	18-20
Human milk.....	3.5-4	7.5	1.25	0.25	20

* Lusk: *Science of Nutrition*, 4th Ed., p. 545.

Fat Content of Human and Cow's Milk.—This table indicates that there are certain outstanding differences between cow's milk and breast milk, not only in the quantity but also in the quality of the chemical constituents of cow's milk and human milk. The fat of cow's milk is different in chemical

composition from the fat of human milk. There is more tripalmitin and less triolein in cow's milk than human milk. The fat exists in a much coarser emulsion, is more difficult to digest and the fatty acids are more volatile and therefore more irritating to the infant's stomach in cow's milk.

TABLE III*

AVERAGE COMPOSITION OF ASH IN MIDDLE MATURE PERIOD OF HUMAN LACTATION

Four to Nine Months

Total.....	CaO	MgO	P ₂ O ₅	Na ₂ O	K ₂ O	Cl
0.207	0.046	0.007	0.034	0.013	0.061	0.036

* Abt: *Pediatrics*, Vol. I, p. 616.

Carbohydrate Content of Human and Cow's Milk.—The sugar of human and cow's milk is identical in chemical composition but the total amount is less in cow's milk. Therefore, after the usual dilution of cow's milk for infant feeding some form of carbohydrate is always added to the feeding mixture in order to make it more nearly like mother's milk in its carbohydrate content.

Protein Content of Human and Cow's Milk.—The total protein in cow's milk is greater than in human milk; in cow's milk being 3.4 per cent and in human 1 per cent. It is therefore usual in making up a formula either to add water to cow's milk, in order to dilute the amount of protein, or to add an acid (usually lactic) to modify some of the protein. There are two types of protein in both human and cow's milk—casein and lactalbumin. They are present in the following amounts:

	Casein, per cent.	Lactalbumin, per cent.
Cow's.....	84	14
Human.....	55	54

It has been shown that lactalbumin is superior to casein in influence upon growth. Since cow's milk contains only 14 per cent of lactalbumin, it is evident that dilution of cow's milk in making up a formula alters its food value for the infant.

Use of Evaporated Milk in Infant Feeding.—The problem of artificial feeding of infants is a problem of making cow's milk as easily assimilated as breast milk. The number and variety of formulas testify to the effort which has been made to achieve this purpose. The chief difficulty has been the cheese-like mass which forms when fresh cow's milk is acted upon by pepsin in the baby's stomach. Cow's milk forms a tough curd, human milk forms a small, soft curd.

Evaporated milk is pure cow's milk which has been concentrated by removing, under vacuum, about 60 per cent of the water. At this point some of the evaporated milks are exposed, in an "irradiator," to the ultraviolet rays of a carbon arc lamp. The rays convert the provitamin D in the milk into vitamin D—thus making it more potent for the development of sound bones and teeth. After concentration or irradiation, as the case may be, the product is then forced through a small aperture which breaks up the fat particles into smaller ones, in fact so small that they never rise to form cream. This process is called homogenization. This means that the fat is more uniformly distributed throughout the milk. The smaller size of the globules facilitates the time of digestion of the fat. The homogenized milk is then put into tin cans and hermetically sealed and sterilized.

Points Considered in the Use of Evaporated Milk.—1. It is free from bacteria because of the process to which it is subjected in evaporation.

2. Due to sterilization, curd from evaporated milk which forms in the stomach of the baby is soft and flocculent; therefore it is more digestible than raw, pasteurized or boiled milk. Homogenization breaks the fat globules of the cow's milk into particles as small as those in human milk. This exposes the fat to a larger surface for the action of fat-digesting enzymes.

3. Willard and Blunt, also Kramer, Latzke and Shaw have shown that the absorption and retention of calcium, phosphorus and nitrogen is especially high when evaporated milk is fed.

4. It contains all the vitamins which bottled milk contains, and in addition the irradiated milks are an excellent source of vitamin D. Neither bottled nor evaporated milk is a dependable source of vitamin C. So it must be supplemented for this factor, just as is bottled milk.

5. It is of uniform composition, being from a large number of herds and is neither Jersey nor Holstein nor from any other breed but is a mixed composition conforming to a set standard.

6. It is in a convenient form for preparing the formula prescribed by the pediatricist.

Vitamin Content of Human and Cow's Milk.—Macy and Outhouse⁸⁵ found that the vitamin A content of cow's milk and human milk is comparable. However, consideration of the destruction of vitamin A in cow's milk through oxidation during the preparation of the feeding formula is a factor to be considered. Therefore it is considered a good feeding practice to add foods rich in vitamin A early in the diet of the artificially fed as well as the breast-fed baby. As sources of vitamin B, breast milk and cow's milk are considered relatively poor, the latter being somewhat superior. Cow's milk is less satisfactory as a source of vitamin C than as a source of vitamins A and B. The amount of vitamin C in raw milk is not very great and if the milk is pasteurized it is decreased, due to oxidation. The amount present is thought to be influenced by the diet of the cow. Researches which have revealed these inadequacies in vitamins A, B, C in human and cow's milk have led to wider use of those supplementary foods in the early months of the child's life which are valuable sources of these vitamins.

Vitamin D has also been investigated and found in very limited and inadequate amounts in both human and cow's milk. The antirachitic vitamin (D) is essential for the stabilization of calcium and phosphorus metabolism and for the normal deposition of these minerals in the bony framework. Both Hess and Gerstenberger have found that the vitamin D in mother's milk may be increased by irradiation of the mother with ultraviolet light. Human milk, originally lacking in vitamin D, may become activated to cure rickets through the action of ultraviolet light. The experimental evidence indicates that the antirachitic value of cow's milk may be enhanced by feeding vitamin D concentrates to the cow but not by irradiating her with ultraviolet light. Cow's milk can be irradiated by exposing it to ultraviolet light. Sunshine and

cod liver oil should be administered early as a method for supplying vitamin D to the developing infant.

The White House Conference Report (Part III) says, regarding this point: "The value of a liberal vitamin supply is emphasized by the work of Daniels, and especially by a recent study of growth of infants fed a daily portion of cod liver oil in addition to the regular formula. Both these infants and the control group received also an extract of wheat embryo containing vitamin B, but as this was given both groups, it is not the potent factor in the result reported. The children receiving cod liver oil not only weighed more at the same age than those who had none, but were considerably heavier than the accepted standards for their respective ages and birth weights. This increase in weight was accompanied by a higher retention of calcium, phosphorus, and nitrogen and an increased elimination of creatinine, regarded as indicative of a better development of muscle. While the better physical development of the children receiving cod liver oil is attributed largely to the increased antirachitic potency of the diet, vitamins A and B may have been significant contributing factors.

"Many other experiments might be cited in this connection but these few instances will at least serve to show some of the ways in which wise use of our fundamental food materials in very simple forms will promote the health and growth of children."

Feeding of the Baby Should Be Under Direction of a Physician.—A comparison of cow's milk with human milk would point to the fact that cow's milk unchanged in any way would not provide a baby with the various food elements in the proportion he needs. It becomes necessary therefore to change the composition in one way or another to meet the individual baby's needs and it is wise to do this under a doctor's direction.

Necessity for Cleanliness of Cow's Milk.—It is important to consider the source of supply of the milk that is to be given to a baby or in fact that is to be given to the family, especially if there are little children. Milk is a most excellent medium for bacteria, both nonpathogenic and pathogenic (disease producing). In the last thirty years laws have been passed in

many states which have aimed to protect the public against receiving a milk supply which has a high bacterial count or which is contaminated in any way; 10,000 to 50,000 bacteria per cubic centimeter may be considered a low bacterial count. Often milk from unsupervised farms may contain more than 500,000 per cubic centimeter. Farms are inspected and certain requirements made as to the way the cattle shall be cared for and the milk handled. Many states require that the cows shall all be tested for tuberculosis, as tuberculosis of cows has been looked upon as a source from which tuberculosis has spread among people. These and other hygienic measures have aimed to produce a milk with a low bacterial count. A low bacterial count does not necessarily mean that the milk is free from pathogenic organisms however, and as these are the special danger, many people believe that the milk should be pasteurized. The fact to be borne in mind is that the baby should receive milk free from pathogenic organisms and this means that one must assure oneself of the safety of the source of the milk, and must also give the milk the right care from the time it is received at the house until it is given to the baby in order that it may not become contaminated.

Preparation of the Formula.—If the formula is made up at home, all the utensils necessary for its preparation as well as the bottles and nipples must be not only washed thoroughly but boiled daily. The milk should have been delivered in a bottle which has a cap completely covering the top of the bottle. If this is not so, the top of the bottle should be washed by pouring a little sterile water over it and wiping off with a bit of absorbent cotton dipped in sterile water. The formula must be mixed and measured in sterile utensils and poured into sterile bottles which should be corked with sterile stoppers, rubber or cork or pledgets of nonabsorbent cotton. It is more satisfactory to pour it at once into individual feeding bottles than to keep it in bulk. It is also a wise precaution to prepare an extra bottle for each twenty-four hours in case of an accident, as to fall short of milk is more disastrous than having some milk left over.

Care of the Formula and Nipples.—The formula is kept in an ice box, preferably a small one kept for that purpose, and

the amount to be used at a feeding heated in the bottle in which it has been standing. Nipples should be made of good rubber, should have no creases or ridges where the milk could collect and should be reversible so that they may be well washed. If one has enough nipples for each feeding in the twenty-four hours they should all be washed and boiled at the time that the formula is prepared and kept in a covered dish which also has been boiled. In picking them up one should take care to touch them only on the edge and not on the part that goes into the baby's mouth. If there are not enough nipples for this procedure the nipple should be boiled before each feeding. Bottle and nipple should be rinsed in cold water immediately after the feeding, and the bottles left filled with water. One's individual technic in regard to preparing a baby's formula and caring for it as well as the bottles and nipples, may vary as long as one keeps in mind the essential of scrupulous cleanliness in order to avoid any possibility of infection. Needless to say, the hands of anyone who is caring for a baby should be washed vigorously under running water before handling anything that has to do with his food. There are some who never use a bottle or nipple for a baby, but as sucking is the normal way for a baby to get his food and as it is possible to keep bottles and nipples absolutely clean, there seems to be no valid reason for using a spoon and cup entirely as a substitute for the bottle if the baby is not nursed by the mother. As the baby gets older it is, of course, well to prepare him for the other ways of taking food and not allow him to continue the sucking method beyond the early infant period.

The milk should be given to a baby at about 100° F. or slightly more than body temperature. It should be heated by setting it into a kettle of water. The milk comes up to the top of the milk bottle while heating the water. Do not put a bottle from the ice-chest into a kettle of water. A bottle will probably break. An additional test of the heat of the milk is to let a drop fall on the inside of the wrist when it is warm but not too hot. The hole in

that the milk will drop in fair-sized drops but not pour. If the drops are tiny and slow in coming the hole is too small and the baby will have to work harder than he should to get his food. The time taken for a bottle feeding should be about the same as that taken for a breast feeding and the baby should be held over the shoulder after the feeding just as is done with a breast-fed baby.

Supplementary Feeding.—It is obvious from the rate at which the body of a child grows that the nutritional demands must be adequately met or retardation of the body processes must ensue. It is equally clear that the tremendous growth of brain, skeleton, muscles, and organs during the first year make demands which cannot be met for many months by the average mother's milk unsupplemented. It is necessary to add foods rich in calcium, phosphorus, iron, and vitamins, in such a form as can be utilized by the child's digestive tract, and in amounts that are suitable.

The statement made in White House Conference Report¹⁷⁶ (Part II) summarizes the present state of our information: "New discoveries in the field of nutrition, the application of exact biochemical and biophysical procedure to food analysis, and extensive experimentation on the laboratory animal and the human subject, have revealed many of the true factors and requirements for satisfactory and progressive growth and have disclosed the sources in which nature abundantly supplies such factors. It is information and data of this sort which have influenced medical opinion and have governed to a large extent the practice, now quite prevalent, of feeding solid food and roughage even as early as the second half of the first year. Feeding infants solid food and roughage as early as the sixth month and even earlier, in exceptional cases of constitutional dyscrasia and idiosyncrasy to cow's milk, is commonly practiced and generally advocated by many physicians in different parts of the world. It may be said that the trend of a decided majority is in the direction of very early addition of such substances to the infant's dietary. There are here and there advocates of raw vegetables as against cooked, and there is no hesitation in giving such foods, finely divided, to the young infant even under six months. While it is known

that the older child has the digestive capacity of the adult for any type of roughage, the question arises whether the very young infant has a similar capacity and has the adequate mechanism to digest and absorb this type of food; and if so whether it is beneficial to him."

"The advocates of the early feeding of solid food and roughage to the young infant point to their excellent clinical results and their experience that it certainly does not seem to do any harm. Those opposed to the practice are quite sure it can do harm, is an unnecessary requirement in the dietary of the very young, and is of practically no value. There is a remarkable absence in the literature of physiology, biochemistry, nutrition, and pediatrics of any experimental work on data bearing upon either side of the question. There are practically no physiologic studies with reference to motility, enzyme function, or other phases and factors which are definitely involved; and the same thing holds true for biochemical studies. There are no data on possible effects due to deficiency or excess of vitamins, on mineral retentions, acid-base balances, or other metabolic studies. It is a field in which empirical experience and seemingly good results have alone governed and actuated our procedure. It is one of the gaps in our knowledge of the nutrition of the very young infant and needs the proof of accurate clinical and laboratory experimentation."

Foods Rich in Vitamin C.—The supply of vitamin C available for the breast-fed infant depends upon the amount present in the diet of the mother. Vitamin C is a necessary element in the infant's food intake to protect him against latent scurvy, also as a precaution against more or less retarded growth and interference with normal development and calcification of the teeth. Unfortunately the average adult diet is frequently low in vitamin C and this vitamin C seems to be the one most often lacking in any milk. To insure against a possible deficiency of this necessary factor either orange juice or juice of canned tomato should be given at an early age; both are potent sources of vitamin C and contain also considerable amounts of vitamins A and B.

Both orange and tomato juice are well digested by the

average healthy child. Both exert a mild laxative effect when given in liberal quantities. Some pediatricists prescribe them for the breast-fed infant in the early months. Starting with $\frac{1}{2}$ teaspoonful a day, increasing the amount to 1 or 2 tablespoonfuls by the latter part of the first year and subsequently to the juice of an entire orange or $\frac{1}{4}$ cup of tomato juice.

If a child has to be given a formula containing cow's milk, the milk should have been either pasteurized or boiled; in either case the vitamin C content is reduced and hence it is essential that orange or tomato juice be given to provide adequate amounts of this factor for the bottle-fed child. The same principle holds true in the use of dried and evaporated milk. As a child is being gradually introduced to cow's milk at least by the sixth month, it must be kept in mind that the milk has been pasteurized and it is necessary to continue the daily use of orange or tomato juice.

Vitamins A and D.—Cod liver oil is added as a protective food to insure an adequate supply of vitamins A and D, and for its stimulating effect upon growth and metabolism. The work of Macy shows the inadequacy of mother's milk in its supply of vitamin D, so that healthy breast-fed as well as artificially-fed babies need cod liver oil. The usual practice is to begin with a few drops daily, and to increase gradually to the dose prescribed by the pediatricist.

Other Vitamins and Minerals.—Vegetables and fruits are valuable in the child's daily food intake because they supply beside carbohydrate, the minerals needed by the body for its maintenance and the building of its new tissues, and the vitamins essential to development and growth. Green vegetables are especially valuable as sources of vitamins and minerals, especially iron, and for providing favorable conditions for its absorption and use in building hemoglobin. The ash of fruits in general shows them to be valuable in maintaining the neutrality of the blood. Both vegetables and fruits are almost indispensable to the child because of their vitamin content. Thin green leaves are as a rule rich in vitamins A, B, and C. Fruit and vegetables which are eaten raw usually contain significant amounts of vitamin C. Cooking may rob

the food of a large share of its vitamin and mineral content unless it is carefully done and the water in which the food was cooked is used in the diet. For this reason it is desirable to steam such vegetables as spinach, carrots, and peas. Vitamin B is much more widely distributed than either vitamin A or C and usually will be included in adequate amounts if fruits and vegetables are used generously.

Some pediatricists find it advisable to introduce sieved cooked vegetables into the child's diet as early as the third or fourth month, other pediatricists defer their introduction until the sixth or seventh month. Spinach is one of the first vegetables chosen, usually because it is high in vitamins, in iron, and calcium. Young carrots, young peas, tender string beans steamed and sieved may be introduced for their mineral and vitamin content. Some physicians with a long experience in feeding children advocate a wide range of vegetables and think that the child should know the taste of at least twelve by the time he is a year old. Others adhere to a more limited number of vegetables. By the end of the first year some children may be getting daily 1 tablespoonful of sieved vegetables which is increased as the child grows to one half cup a day and later to a cupful at each of two meals.

Fruits are valuable in the child's diet not only because they are sources of vitamins and minerals but also because they contain cellulose and fruit sugars. Stewed fruits and their juices are also valuable for babies in their laxative effect. The juice is usually given first and later the fruit, pressed through a wire strainer. The age at which fruits are given as a regular part of the diet varies with the practice of the pediatricist in charge of the child. Some pediatricists introduce fruit into the diet at three months, others wait until six months or later. It is wise in the introduction of any new foods to use a small amount (not over a teaspoonful) until the child becomes accustomed to it and learns to like it. Prunes are frequently chosen as the first to introduce because of their high iron, cellulose, vitamin, and carbohydrate content. Recent research has shown that apricots are effective for hemoglobin building. Here as in vegetables a teaspoonful is the amount usually given until the child adjusts to the new food.

"Raw fruits should be given to a young child only on the advice of a pediatricist and then with judgment since if they are not ripe or finely divided they will irritate the digestive tract inducing disturbances which prove very discomforting to the child. The eating of some raw fruit or vegetable in addition to orange or tomato juice should become habitual very early. For the child who cannot be trusted to masticate well it may be finely cut or chopped but as soon as possible the habit of chewing of such food should be established."* By the end of the first year the child should be able to take daily 3 or 4 tablespoonfuls of stewed fruit in addition to orange or tomato juice.

Energy Foods.—As the child grows and becomes more active the food value of the mother's milk, even when supplemented by cow's milk, is not adequate to meet the increased demands for the development of his body and his energy output. It is necessary therefore to supplement both the mother's milk and cow's milk not only with vegetables and fruits, high in minerals and vitamin, but with other foods which are rich in carbohydrate, such as cereals and potato. Cereals, of the whole grain type, are given sufficiently cooked and at first they are strained in order to more finely divide the coarse particles that might be a source of disturbance to the delicate mucous membrane of the child's intestines. Many children's specialists introduce cereal at the sixth month, beginning with a teaspoonful of such cereal as cream of wheat, and gradually increasing it to 2 or 3 tablespoonfuls daily. Whole grains would seem preferable on account of their mineral and vitamin content to the highly milled ones. It is not always possible in a local market to secure whole cereals, because they are not satisfactorily stored for long periods, difficult to mill, and the local demand may not be great enough to keep an adequate stock on hand. In such cases it should be remembered that the more highly refined product *can be* adequately supplemented with other *foods* and the losses in vitamins and minerals can be thus met.

It was formerly thought necessary to cook the cereals for four hours to break down the cellulose covering of the starch

* White House Conference Report,¹⁷⁶ Part III, Nutrition, p. 446.

granules and render the starch more available for digestion. Recent investigation tends to prove that such prolonged cooking is not necessary for the digestion of cereal and that if cooked until palatable, smooth and soft it will be comfortably and easily digested.

SUGGESTED QUESTIONS

1. Why is it desirable to introduce new foods into young children's diet as early as the physician prescribes them instead of waiting until children are older?
2. Compare advantages and disadvantages of breast feeding and substitutes for breast feeding.
3. How does the diet of the nursing mother affect the baby?

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CHAPTER IV

GROWTH DURING THE PERIOD OF TRANSITION FROM INFANCY TO EARLY CHILDHOOD

DEVELOPMENT OF MOTOR COORDINATION ✓

General Activity.—The period from nine to eighteen months is one of rapidly increasing facility in locomotion. Forbush, Shinn, Rasmussen, Gesell, Koffka, and Stern all agree that this is a time in which the child learns to creep, to pull himself up by chairs, to climb, to walk, and to control his body as a whole. Shinn and Fenton report that the children being observed by them climbed stairs and “everything else possible” at twelve months. It is not unusual to see children of fifteen months climbing stairs with the aid of a banister, one step at a time and on all fours much as puppies do, or coming down stairs, again with the aid of a banister, by dropping to a sitting posture on each stair, wriggling to the edge, standing on the next stair below, dropping down, and so on. If given sufficient opportunity for practice on stairs that do not offer too great hazard, children of eighteen months can ascend and descend stairs in an upright position and with the aid of a banister only.

With all the experimenting in general bodily movement characteristic of this age, it is interesting to note that dropping from a standing to a sitting position takes almost as much, if not as much, learning as pulling up from a sitting to a standing position. Most children, however, have achieved both skills by the time they are a year old. The proportion of the body, the short legs and longer trunk, tend to make the movements clumsy and it requires a long period of experimenting until the child can adjust the center of gravity of his body so that he can stand and move with the assurance of not falling.

Walking is the Most Spectacular Accomplishment of This Age.—We give the discussion of walking a good deal of attention at this age period because it seems a single general developmental process which epitomizes the previous motor development. It is, in a sense, a summary of the child's preceding motor accomplishments, and has come to be so regarded by parents and nurses. Most people fail to catch the significance of failure to splash in the bath at three or four months of age, or to oppose the thumb in grasping before six months, but few people are undisturbed if their child fails to walk by the time he is eighteen months old.

Average Age of Walking.—We find occasional reports of children who have walked at nine months, a rare report of walking at eight, or even at seven months. A much more usual age, however, is twelve months, Gesell⁴⁸ reporting 20 to 49 per cent of his children walking alone at this age. Variot¹⁶³ states that 67 per cent of children walk between the age of eleven and fourteen months. A few children, otherwise normal in development, may fail to walk before eighteen or twenty months because of physical illness, lack of practice, or other reasons.

Perfection of the Skill of Walking Extends Over a Long Period.—We are inclined to think of walking as a function established and complete in a fairly brief space of time at the close of the period of infancy; we fail to realize that as a skill it begins as training in early infancy with the stretching and wriggings which teach coordination and lend strength to all muscles of the body; nor do we as a rule understand that progress in perfection of the skill of walking extends throughout the entire period of childhood. Before the child walks he must have experienced a long prerequisite training in coordination and strengthening of the muscles which begins as early as the third or fourth month and continues well past the two-year level. Baldwin and Stecher¹¹ studied the skill of three- to five-year-old children on a walking board and found a progressive increase in this ability from three to five years with a maximum increase between three and four years. Gesell⁴⁸ reports continued progress in locomotion throughout the preschool period and cites the sequence as follows: "In

four months the child holds his head erect; in nine he sits erect; in twelve he stands erect; in eighteen he walks with a skill which is distinctly human. Hopping, skipping, jumping, standing on one leg, dancing, perhaps even pirouetting may all come before school age." All these are regarded by Gesell as important aspects of the skill of locomotion.

Development of Courage or Timidity a By-product of Motor Learnings.—If we regard the degree of satisfaction accompanying an act as evidence of the innate character of that act, we can scarcely dispute the innateness of the urge toward locomotion, at least in most children. The thrill of accomplishment which accompanies each new bit of learning seems genuine as he throws back his head to crow his delight, or as he abandons himself to an orgy of practicing his new achievement. The number and severity of bumps that some children take without complaint or discouragement in the process of learning upright locomotion seems proof of intense absorption. We miss an excellent opportunity to teach physical courage if we curb his freedom or seem too concerned over his bumps during this absorbing learning period.

Reasons Why Some Children Are Slow in Learning to Walk.—Since so much importance is attached in the minds of most parents to the achievement of walking, let us analyze some of the reasons for delay. From what has been said above, we can readily understand that walking is a skill, the development of which depends upon many things. Variot thinks that the most important factor in walking is *age*, meaning that if we were to correlate success in walking with all other factors possible we would find the highest correlation to be between success and the ages of the children studied. He also feels that the most frequent reason for disturbed or retarded walking is to be found in acquired or congenital diseases of the nervous system.

There are, however, a number of other factors which contribute materially to success or failure in walking. The child's *nutritional condition and general physical health* are of prime importance. If he is greatly overweight, if his muscles lack tone, or if he suffers from rickets, he cannot be expected to support himself in an upright position as soon as would a

normal child. If he has been or is ill, he probably lacks the necessary muscular strength for walking which, being a new and unaccustomed activity, demands great strength and energy. Illness handicaps him also because it curbs his interest in activity and thus deprives him even of the amount of practice his small physical strength might endure.

Space which is too limited, floors which are too slippery or too drafty or too dirty to permit freedom for practice, will handicap the child. He should have the larger part of some room in the home, the floor of which is protected from drafts and if possible equipped with linoleum which can be kept clean but which is not too slippery for unskilled feet. *Clothing and shoes* are important, too, since the child must not be hampered by dresses which upset him when he tries to stand, nor by shoes that are too small or too soft. He should wear the minimum amount of clothing permitted by the weather. Overalls which fit closely enough to keep out of his way conserve laundry. Shoes with a firm enough sole to support his feet, as well as to keep him from wearing blisters on his feet, are helpful. Corset shoes (high shoes with corset steels to support the ankles) are neither necessary nor desirable since full play of the muscles is necessary to strengthen the feet. Lace oxfords are to be preferred unless high shoes become desirable for warmth in winter or for support of an overweight child. Button shoes or slippers with button strap do not offer enough support because they cannot be adjusted daily to the child's foot and leg.

Mental Development.—Not many years ago we thought that every child who delayed walking beyond the twentieth to twenty-fourth month would turn out to be feeble-minded. The chief reason we worried about his slowness was, not that he might be physically or emotionally inadequate, but that he might be intellectually inferior. But having followed children who were late in walking we now know that they often turn out to be normal or even superior in intelligence. Aoki⁵ found in studying 53 children of school age a correlation between age of first walking and mental test scores made at the time of the study to be only 0.19, which is not a significant correlation. He found the correlation between age of walking and scholar-

ship in school to be 0.53, a significant but not a high correlation. On the other hand Mead,⁸⁸ in comparing the age of walking in feeble-minded children with that in normal children found that the normal children she studied had walked on the average at thirteen and eighty-eight hundredth months, whereas the feeble-minded children studied did not achieve this skill until twenty-five and eight hundredth months on the average. It seems evident that all feeble-minded children are late in walking, but the converse is not true, since all children who are late in walking are not feeble-minded.

Certain *emotional factors* are also of importance in determining the speed with which children learn to walk. Severe accidents may produce fear and timidity. Too great anxiety on the part of adults over casual bumps may convince a timid child that he takes too great a risk in trying to walk. Too great enthusiasm over his first attempts may inhibit a self-conscious child, or too ready laughter at the "cuteness" of his gait may take on an aspect of ridicule. If the parents become overanxious because he does not walk the feeling of anxiety soon conveys to the child, attaching excessive importance to his learning and making him too afraid of failure.

Again, some children have no *motive* for walking or locomotion of any kind, and this may prove sufficient to delay the effort, especially if they have not discovered the thrill of movement for its own sake. It is a good idea to let the six- or eight-months-old baby struggle a bit when he has let his rattle drop only a few inches from him. The thrill of recovery will attach satisfaction to his efforts and encourage him to make a greater effort the next time. Give a nine- to twelve-months-old baby a ball to play with. The urge to pursue it will provide him with real motive for practice in locomotion. In fact, balls of varying sizes and weights provide an unexcelled type of "teaching toy" from a few months of age through the entire period of childhood. Some of the child's wants that can be obtained through his own locomotion should be withheld in order to provide him with natural motives for practice and with natural satisfactions as rewards for his activity. Thus, he may learn the joy in activity for its own sake which will serve him well as a habit of health in later

years. Other children to play with provide natural circumstances which encourage activity and are from an early age as important for this reason as for the reason that they give stimulus to social development.

We should remember, too, in this connection that walking, like all other motor and verbal skills, may suffer an apparent setback because of illness or because of a *diversion of attention to some other activity*. All development is dynamic. It



Fig. 19.—This simple backyard equipment is one mother's solution of the exercise problem.

seldom flows smoothly and continuously. Children often seem to have learned to do something and then to forget it. This is because, although the first learning has been accomplished, attention may be turned elsewhere before the motor habits have been well set, and the child seems to forget for a time what he had learned. When attention returns, however, we find that he has not entirely forgotten, but soon "brushes up" the learning and goes on with the fixing of the skill habits.

Equipment to Encourage Motor Development.—In considering the increased activity which accompanies the growth of the infant, it seems important to mention the value of equipment involving the use and growth of muscles as well as the place equipment may have in the sensory development of the young child. For the very young baby equipment for motor development involves objects which can be used in the immediate environment of the crib. As sensory development progresses the arms and hands are moved—waved about, and the muscles of the arms and back, as well as those moving the hand come more and more into use. Substantial balls which may be “felt” and waved about are simple toys which increase and encourage the use of muscles at this early period of development. A specific time when the infant is given complete bodily freedom for kicking his legs and waving his arms should early become a part of the daily schedule. The period immediately after the morning bath is often used for such activities.

Equipment in the yard or playground for a child of nine to eighteen months may offer many opportunities for development of motor control and motor coordination. For the finer movements similar to those used in indoor equipment, the sand pile, with dishes, spoons, and sieves, activities of pouring sand and shoveling sand, with pails for carrying, all are a part of the equipment which aids in the development of finer motor coordination. The equipment out of doors develops in the very young child a sense of balance and surety about his own body. Climbing up and down steps and slides, climbing over packing boxes, the jungle gym or some substitute for climbing, all necessitate the use and development of the larger muscles of the legs, arms and back and develop a surprising agility at an early age.

The child should have a small corner of some room in the house for his own in which he may be surrounded by certain of his individual possessions and equipment. By eighteen months he enjoys carrying large blocks back and forth, and is developing an increasing interest in building with blocks. The finer, more carefully adjusted movements are encouraged by the use of equipment at table play—such as form boards,

cylinders, peg boards, boxes with covers, etc. Everyone is acquainted with the baby who when first creeping finds his way to the kitchen cupboard where he loves to pull out the pots and pans and manipulates covers, parts of double boilers, etc. There are few experiences available to a young child which are more educational than play with his mother's pots and pans; since even though such play means extra dishwashing for her she may be well rewarded by the knowledge that she is providing a profitable as well as a happy time for her baby.

When the supervision of an adult on the playground is necessary her rôle should be almost entirely that of an "on-looker" who may anticipate dangerous situations, encourage and suggest, giving the child a feeling of safety and a sense of accomplishment and success rather than failure. As nearly as is possible she should allow the child to explore at his own will, to learn about places and things by his own experience and not through "pressure" or "bullying" from an adult.

Motor Experience Is Necessary to Normal Motor Development.—The training in muscular coordination that comes to young children through climbing up and down steps, over large boxes, pushing loaded wagons we have no way of measuring. It is not uncommon, however, to observe in children a certain lack of skill in handling their bodies, a certain sense of physical instability which results from not having had an opportunity to perform these movements. A case in point is that of Edward. When Edward came into the nursery school at twenty-five months of age, he had lived all his life in the second floor of a duplex apartment. There had been no yard or outdoor play space, and he had been carried up and down the steps into the apartment. When out on the street he was either wheeled by his mother in his "go-cart" or led by the hand for a few blocks. He had no experience in the coordination of his body in climbing a ladder, mounting the jungle gym, climbing into the crow's nest. All these movements had to be learned. It was several months before he could mount without apparent concern the small ladder by which children of his own age climbed to the measuring board in the physical growth laboratory. So far as one could judge it was not fear of falling but an inability to induce muscular

coordination. That his environment was responsible for this condition was proved by his prompt response to opportunity to use play equipment and the subsequent disappearance of his awkwardness, lack of balance, and sense of physical inadequacy.

The Newly Achieved Ability to Get Around Permits a Tremendous Increase in Intellectual Horizon.—At nine months the baby is restricted in his environment to the space he can cover by creeping; but at sixteen and eighteen months he can walk, run, and climb, thus extending his environment for exploration to practically every part of the house and yard. He need no longer wait for things to come to him or to be taken places; he can now go to new scenes on his own volition. His delight in motor achievement occupies him tremendously at this period; yet, he seems to have also an almost insatiable appetite for sensation. In fact, his investigative trend often leads him into trouble, since he has not yet learned that ink bottles and gas jets are to be let alone. Everything seems to offer him possibilities for new sensations. Mother's dressing table, father's desk, the kitchen cabinet lure him irresistibly.

The child begins now to discover bigness and littleness, hardness and softness, roundness and squareness, heaviness and lightness, and all the other properties of objects—as yet only superficially, but nevertheless, as factors to be learned about and to be taken account of in action. Eye-ear associations, eye-hand coordinations, the relations of each sense and each bodily skill to all the others are being built up rapidly. He is, in a sense, perfecting the machinery by which he is to learn about the detail of the world around him. The learnings themselves are well begun when he is eighteen months old, but so much takes place in the next age period that we shall reserve our detailed discussion of sense perceptions until the next chapter.

Development of Manual Skill.—Not only does the nine to eighteen months period increase the child's experience by permitting him a greatly enlarged capacity for getting into contact with the world. It also permits him to feed his mind with a manifold of sensations which he gains from his new world through exploration and manipulation with his hands. At

six months, we recall, the child has learned to use his thumb in opposition to his fingers in grasping, but he has not yet discovered the advantage of a "pincer technic" (Gesell's term) in picking up objects. If he wishes to secure an inch cube or other small object from his tray he uses a "palmer scoop" (also Gesell's term), descending upon the object with his whole hand and usually succeeding in picking it up only when he has pushed it against a corner or side of his tray. At nine months, however, he has learned the advantage of approaching the object with his fingers and thumb, and can usually pick up small objects between thumb and fingers or approach a small dish by placing thumb and fingers over the edge. At twelve months he is fairly skillful in the manipulation of objects, and can place a cube in a cup, a cup on a saucer, or one small tray on top of another with comparative ease. In fact, the use of objects, one in relation to the other, as cup on saucer or spoon beside plate, is usually begun at this age. *1 yr old*

Reaching.—Gesell has an interesting test to show the child's adaptation to materials which interest him. If we present a child of less than six months with a small wooden cube and then with a second, he is more than likely to drop the first in order to take the second. At four months he usually reaches incipiently with both hands, his whole body as well as both hands participating in his eagerness. Such reaching is not as a rule effective; but soon the reaching becomes more nearly narrowed to the use of the two hands and becomes more efficient. At six to nine months the greater efficacy of reaching for objects with one hand has been learned, and as is characteristic of new learnings he seems unaware for the moment of other possibilities; so he uses only one hand, dropping one prized object for another. He learns quickly, however. By nine months he uses each hand with enough independence from the other that he can retain the first cube while he reaches for the second. Three cubes, though, are too much for him; he drops one or both of the first two to gain a third. At twelve months he is equal to three, occasionally reaching for the third with his mouth, and at eighteen months he can accept a fourth or even a fifth without losing those he already possesses.

Learning to Let Go of Objects.—It is interesting to note in connection with use of the hands at this age that learning to let go of objects is almost as difficult as learning to take hold of them. We can see this if we watch a fifteen- to eighteen-months-old child learning to throw a ball. At first he is almost sure to let go of it at the wrong time, dropping it behind him or flinging it straight up in the air. He usually takes several trials to learn just when to let go in order to make an effective throw.



Fig. 20.—This two-year-old child is duplicating the movement of her right hand with her left hand. This bilateral type of activity is very characteristic of the first half of the third year. Note also her squatting position. This too is characteristic.

// **Symmetrical Movements.**—It is interesting, too, that in spite of the fact that he has at nine months learned to inhibit one hand in reaching, he still has at twelve to eighteen months a tendency to balance other types of movement by symmetrical movement in both halves of the body. We see him feeding with one hand and duplicating part of the movements in the other, or stirring in the sand box with one hand and making circular movements in the air with the other. These symmetrical movements must be inhibited as he grows, since he

must learn to use two hands together in cooperative but not duplicated movement. Drummond³⁵ notes that the child Margaret used one hand to hold the waste paper basket and the other to get the paper out of it at twelve months, but succeeded in doing so only after many unsuccessful attempts to do it all with one hand.

Thumbsucking.—So large a proportion of infants suck their thumbs at some time during infancy that thumbsucking becomes a problem of importance in the minds of many parents. There are numerous theories to explain why the habit is so usual among infants. One group of physicians and psychologists explain it as due entirely to *inadequate feeding*: the amount of food is too little or too great, the quality is unsatisfactory, the intervals between feeding are too long or too short. If this is the case the correction of thumbsucking lies in changing the feeding schedule or the food or both. The physician is the person to determine when and how this should be done.

Another group of specialists claim that the habit is due to *inadequate satisfaction of the sucking impulse*. Milk flows too freely from the mother's breast or the bottle and the child's hunger is satisfied before he has sucked vigorously enough or long enough to satisfy the sucking impulse. The corrective in this case is to leave him at the breast longer or to provide adequate sucking in some other way.

One school of psychologists claims that thumbsucking is due to an *unsatisfied craving for affection*, or to other unsatisfied emotional urges. Another group explains it as a *chance habit* established when the baby's fist comes by chance into contact with his lips with a resulting instructive sucking and satisfaction. There are still other explanations offered. No doubt each theory explains some of the cases; probably no one theory explains all of the cases.

What Should be Done About It.—Whether or not we decide to correct the habit at all, however, depends upon our attitude toward it. Some people maintain that thumbsucking is a dangerous infantile habit which if persisted in will not only deform the child's mouth but, much more serious, will warp his personality by encouraging infantilism and retreat from

reality. Other writers are inclined to regard it as a legitimate consolation to be listed among the simple and desirable pleasures of babyhood, or at worst, as a hangover of a necessary and desirable method of food getting; in any case this latter group feels that nothing should be done about it.

Probably in this, as in most arguments, some middle ground will prove nearest to the truth. There seems little doubt that thumbsucking when prolonged beyond the third year, or when accompanied by habits of fingering materials, pulling an ear, twisting a lock of hair, or titillating the genital organs, is a practice to be discouraged and as soon as possible eliminated. Its effect upon the shape of the teeth is discussed on page 119. Then, too, when the habit engrosses the attention of the child during waking hours and thus competes with his active interest in the manipulation and exploration of objects, it is obviously a hindrance to the rapid mental development characteristic of the transitional and early childhood periods. It will not, however, even in its most exaggerated form, produce feeble-mindedness, although it is sometimes seen in exaggerated form among feeble-minded children, with whom it is a result rather than a cause of the feeble-mindedness.

On the other hand there is no doubt that overanxiety or even panic on the part of some parents, with the resulting concentrated campaign against the habit, often in itself exaggerates the habit by keeping the matter persistently before the child, never allowing him to forget it. Too vigorous an attack upon the problem not infrequently rouses active antagonism on the part of the child, or becomes a battleground upon which the child can be sure to gain attention and excitement. Spankings, for example, are usually exciting, and certainly leave no doubt in the child's mind that he is, for the time being at least, the center of his parents' attention, a fact which often overbalances even the sharp physical pain involved and makes the spanking a reward rather than a punishment.

Mechanical restraints are sometimes helpful if used before the habit has become too important to the child, or if used with older children as a reminder when they themselves have decided to conquer the habit. If, however, such restraint is

used in the face of opposition from the child, it serves, like constant nagging, not only to keep the habit active in his attention and hence to fix it in his behavior, but it serves also as a challenge wherein he can achieve conquest over, or at least aggravate, the adults who have set up the challenge.

In any case, the most effective weapon against the habit is the setting up of so sound a physical régime, so constructive an educational program, and a daily life so emotionally satisfying that thumbsucking drops away because it is outgrown, because it no longer is needed as a consolation for an empty life or as a satisfaction where other more wholesome satisfactions are lacking.

Control of Muscles Involved in Elimination.—One of the most difficult pieces of learning that has to be accomplished during the nine to eighteen months period is the control of muscles involved in elimination. Some children learn the lesson of bladder and bowel control fairly easily; with other children almost infinite patience is necessary before complete control is accomplished.

Some children, in fact, seem to develop the necessary control almost without specific teaching. Children for whom this is true are usually those who have a stable physical rhythm, and who have been kept dry and clean during waking hours since birth. It is ordinarily not wise to waken an infant to change him, but if awake, he should be kept clean and dry so that he does not become accustomed to the feeling of wet or soiled diapers. Whether or not he "trains himself," so to speak, his learning will be greatly facilitated if he feels comfortable only when dry and clean and if he never learns to tolerate being soiled or wet. His "drive" toward voluntary control will be greater.

Rare children whose physical rhythm is regular can at a few weeks of age be held over a chamber in their mother's or nurse's laps before or after feeding with such success that they never know what it is to have a soiled diaper. The sensible mother, however, is not disturbed when irregularity of rhythm or an upset of some sort brings failure, since neither she nor the baby should have a sense of failure in this important function during the early months of infancy. Until the baby

is several months old the attitude should be one of welcoming success when it occurs but not of feeling defeat on the frequent occasions when failure is probably inevitable. There are even some children who should not be subjected to any "training" program at all until they are several months old, aside from the attempt to keep them from lying for any length of time in wet or soiled diapers. The doctor should be the person to decide how much handling and "training" each child should receive.

Ordinarily, however, the average normal, healthy baby can be held over the chamber as a routine before or after feeding with the result that he will soon achieve a number of successes and will come to associate elimination with the chamber. The most essential part of this process must be patience and optimism on the part of the mother. She must never become cross or tense, and the baby must not become overtired or irritable, since it is important not to allow a habit of antagonism or of anxiety to become associated with so routine and necessary a function as elimination. This rule holds at every stage of toilet training.

So important is this rule that some writers (particularly English writers) advise parents not to undertake any training at all until eighteen or twenty-four months, when the child is old enough to quickly make the necessary associations with the toilet and to achieve the necessary muscular control. Thus both parent and child avoid the strain of repeated failures and long learning. Other writers, however, feel that if we wait too long the habit of involuntary elimination becomes too firmly fixed and requires too intensive a program when training is undertaken. At whatever age the training is given it should be accomplished with patient attention to routine, with emphasis upon successes rather than upon failures, and should under no circumstances be allowed to develop into a focal point of strain, tension or antagonism.*

Summary of Motor Accomplishments.—In summary, the following are some of the motor performances that investigators have found characteristic of *twelve-months-old* babies. Authorities are cited wherever authorities seriously disagree.

* An excellent discussion of toilet training can be found in Blatz and Bolt, "*Parents and the Preschool Child*."

Can open and shut lids; pull things out of boxes and sometimes put them back. Can put the cork in a bottle.

Is dainty and fairly skillful with pincer technic in handling small objects. The thumb and forefinger are specialized for use in touching and pointing.

Makes funny faces—can amuse himself thus—it is not wise for adults to be amused at this unless they are prepared to refrain from punishing the same trick later.

Can throw a ball (according to Fenton and Lucas).

Can walk with help (Stern and Bainard).

Can lower self from standing to sitting position.

Climbs stairs using hands and knees (Shinn and Fenton).

Can hold a crayon and make strokes (Gesell).

Can hold cup to drink from (Gesell).

Is learning to inhibit hand to mouth.

Pulls off own stockings or cap; waves "Bye-bye"; plays pat-a-cake.

At *eighteen months* his motor accomplishments are in general more skillful.

He handles objects more smoothly and with greater sureness; he cannot only pull things out, *e. g.*, books from the bookcase, but can turn the pages deftly and can learn to put them back.

He walks alone, can even run, walk up a low inclined plank with good balance, can climb the stairs in an upright position one foot at a time with or without the banister, and can do queer jigs to music.

He can cross his feet, and can stand on one foot (Stutsman).

He can scribble with pencil or crayons, string large beads, build a straight tower of at least 3 blocks, fold a single crease in a paper.

He can take off his shoes and stockings; can learn to wash his own hands and face; can help set and clear his own low table; can wipe a dish or two; can learn to dust, and to wipe up spilled things, and can use his handkerchief properly.

He can eat with a spoon without much spilling; can hold his glass and drink neatly.

Before leaving this account of motor skills we must again recall that their development depends on native ability in part, but also upon opportunity. The right physical and emotional environment determines the extent to which native ability can be developed. Plenty of space, simple equipment, and freedom from oversupervision are requisite to sound motor growth.

ENERGY DEMANDS

The energy demands of the child at this period are increasing rapidly. Not only must they meet (1) the maintenance of the life processes which are more rapid than the adults, but must provide for (2) the muscular activity, which increases rapidly and is comparatively great, and (3) allow for storage in growth. Internal activity, of which pulse and respiration are examples, also makes demands upon the energy intake. It is to be remembered that crawling, walking, in fact, all bodily movement, is accomplished with great effort at this age. This is due to the fact that the muscular coordination is not fully developed. It is true also that the body is not yet able to effectively regulate losses of its own body heat.

Fuel Value of Food Intake of Infant.—The White House Conference Report on the "Growth and Development of the Child," Part III,¹⁷⁶ has summarized the data available regarding the "Total Caloric Intake of Infants" as follows:

"The total caloric intake of normal growing infants was collected from the literature and averaged for infants of different ages. These figures were compared with a series of normal infants in private practice and it was found that the food needs of infants of equal physical development agreed very closely. In infants of approximately the same age, height, and weight, the total caloric needs for twenty-four hours are as follows:

	Calories.
1 month.....	500
2 months.....	610
3 months.....	675
4 months.....	720
5 months.....	760
6 months.....	795
7 months.....	820

	Calories.
8 months.....	860
9 months.....	880
10 months.....	900
11 months.....	940
12 months.....	1000
24 months.....	1200

"The figures just given should be taken to represent averages and should not be applied too literally to a given infant. A 10 per cent variation was seen in the cases on which they are based.

"The foregoing remarks make it clear that the standards of food requirements during infancy are based in large part upon rough estimations of the food intake, and not actual measurements. The difficulty experienced in obtaining metabolism studies with measured food intake and output from the body is due to the fact that the infant has to be confined to a metabolism bed, which in itself necessitates abnormal conditions and artificially restricts and modifies the amount of exercise. Most of the subjects employed in these investigations are hospital patients, and thus introduce other abnormal factors. It is clear, then, that the total caloric needs of normal infants should be studied anew. Data thus obtained under perfect conditions will undoubtedly modify the standard table of total food needs given before."

Murlin⁹⁸ believes that the influence of muscular activity becomes an increasingly important factor in the total metabolism as the child grows older. He estimates the basal requirement for an infant to be 60 calories per kilogram per hour. Basal metabolism studies have shown if the infant cries very much and very hard his heat output may be increased 100 per cent for a short time. For the average infant, if he sleeps an average length of time the allowance for activity made by Talbot is an increase of 25 per cent to the basal metabolism. Since the amount of exercise varies with the character of the child, his physical health, the comfort of his surroundings, much more work must be done before the amount allowable can be accepted as anything but a rough estimate. As stated in the White House Conference Report, Part III, p. 391,¹⁷⁶ "Although some attempts have been made to de-

termine how much energy is expended by active infants the data are still so sparse that most of the estimates are guess-work."

The requirement for activity increases steadily as the child spends more and more time awake. The requirement for growth in relation to weight increases certainly for the first three months and possibly up to six months, after which it flattens out. As the child grows older and passes beyond the nursing age, the muscular activity becomes so great as to present peculiar problems to the investigator whether of basal metabolism, of muscular efficiency or of the total daily needs.

Increases in Height and Weight.—Increases in the height of boys and girls during this period (nine to eighteen months) average $3\frac{1}{2}$ inches, which is just half of the increase during the first nine months of life. It is to be kept in mind that these figures are averages and do not represent individual children's rate of growth. According to the United States Children's Bureau Standards the average height for boys of nine months is $28\frac{1}{4}$ inches and for girls $27\frac{5}{8}$ inches. Boys of one year measured $29\frac{1}{2}$ inches and at eighteen months $31\frac{3}{4}$ inches. Girls of one year measured $28\frac{7}{8}$ inches and of eighteen months measured $31\frac{1}{4}$ inches. The increases in weight for these increases in height average 4.9 pounds for boys and 4.4 pounds for girls, as compared to 11 pounds gain in the first nine months. Although the increases in height and weight are less in this period than in infancy they are not therefore unimportant and should be watched with the same diligence. The Children's Bureau Standards show that nine-months'-old boys measured $28\frac{1}{4}$ inches, weighed $19\frac{5}{8}$ pounds, year old boys measured $29\frac{1}{2}$ inches, weighed $21\frac{3}{8}$ pounds, and boys of eighteen months measured $31\frac{3}{4}$ inches, weighed $24\frac{1}{8}$ pounds. Girls of nine months measured $27\frac{5}{8}$ inches, weighed $18\frac{1}{2}$ pounds; girls of one year measured $27\frac{7}{8}$ inches, weighed 20 pounds and girls of eighteen months measured $31\frac{1}{4}$ inches, weighed $22\frac{3}{4}$ pounds. Tables XXI and XXII taken from the Children's Bureau Standards show the increases in height for each month and the accompanying increases in weight for corresponding increases in height.

ERUPTION OF THE TEMPORARY TEETH

The Growth of the Tooth.—According to well-known authorities,* “During the growth of the tooth the crown leaves the crypt where it had its initial inception and where it completed its development to emerge from the gum and take its position on the crest of the alveolar process in the mouth. Thus the tooth crowns are transposed from the points of inception to the place where they become of functional use. The appearance to view of the tooth crowns as they are emerging from their hidden places is known as the eruption of the teeth. But while this transposition or eruption is taking place in the fully formed crown of the tooth, the partly formed root supporting it keeps on growing by increments in the opposite direction until the root or root apex is finished. The root thus remains implanted, as it were, in bone tissue which becomes simultaneously modified into the tooth socket. Coincidentally with this there is developing a sheath made up of tough connective tissue fiber which surrounds and attaches the root to the walls of the tooth socket, acting as a cushion to ward off violent shocks and carrying blood vessels and nerves for the tooth.”

The temporary teeth begin to form in the seventh week of fetal life, the crowns calcifying at about the seventeenth week of fetal life. By this time the permanent teeth are beginning to form and their crowns begin to calcify about a month before birth.

Order of Eruption.—Since teeth and jaws are an integral part of the bony skeleton of the body, the relationship between the eruption of teeth and general body growth has been a matter of great interest. Certain facts are recognized such as that in all instances with the exception of the premolars, the lower teeth erupt before the upper. The difference in time is variable. The teeth of girls erupt before the teeth of boys. The time is variable, the smallest difference of about two tenths of a year, is in the time of eruption of the lower first molar. The largest difference, of over a year, is in the time of eruption of the lower canines. It has been claimed that

* White House Conference Report on “*Growth and Development of the Child*,” Part II, p. 149.

provided children are of the same race and economic group taller children are dentally more accelerated than smaller children of the same group. Recent studies confirm this claim. Channing and Wissler demonstrated a relation between eruption of teeth and the growth in size and form of the palate. The same authors indicated quite clearly that irregularity of the teeth occurs quite commonly among normal individuals and is not a characteristic mark of degeneracy. Mellanby has conducted experiments which show, among other things, that there is a relationship between the state of nutrition and the eruption of teeth.

There is a wide variation in the age at which teeth appear and too much concern need not be given to the age at which they appear unless the retardation becomes a serious matter of months. Some families have a tendency for all their children to erupt the teeth at a later age than the accepted averages, other families tend to an early eruption. In the same family there may be one child who will cut his teeth at an early age and another at a considerably later age. The factors influencing the age at which teeth erupt await further scientific investigation.

There seem to be periods of activity in the cutting of the temporary or baby teeth, according to Scammon, followed by periods of quiescence. As the child grows older the time between periods of activity grows longer. Here as in the age of eruption there is wide variation and the ages suggested are merely guides to the parent or the observer of children.

Scammon¹²⁷ in discussing the chronology of the eruption of teeth says that "the eruption of both the deciduous and permanent teeth is subject to great individual and probably some race variation. Table IV compiled by Scammon from various sources indicates that the deciduous or baby teeth begin calcification during the fourth and fifth months of prenatal life, so that the supply of calcium afforded during this period is important. The medial incisors or the two front teeth erupt usually at the sixth to eighth month. The lateral incisors about one month after or from the seventh to the ninth month. The first molars, commonly known as the "jaw teeth," erupt at fourteenth to fifteenth month. The canines, commonly

TABLE IV
SUMMARY OF THE DEVELOPMENT OF THE DECIDUOUS TEETH
(Based on the Observations of Broomell and Fischelis, and Rose)

Upper and lower teeth	Calcification begins.	Calcification completed.	Usual time of eruption.	Decalcification begins.	Shedding begins.
Medial incisors.....	4th fetal mo.	16th to 18th mo.	6th to 8th mo.	4th yr.	7th year
Lateral incisors.....	4th fetal mo.	10th to 16th mo.	7th to 9th mo.	5th yr.	8th yr.
Canines.....	5th fetal mo.	2 yrs.	17th to 18th mo.	9th yr.	10th yr.
First molars.....	5th fetal mo.	18th to 20th mo.	14th to 15th mo.	6th to 7th yr.	10th yr.
Second molars.....	5th fetal mo.	20th to 22nd mo.	18th to 24th mo.	7th to 8th yr.	11th to 12th yr.

known as the "eye teeth," erupt at the seventeenth to eighteenth month, and the second molars at the eighteenth to twenty-fourth month. Scammon in the same table presents interesting data regarding the age at which calcification is usually completed. The medial incisors which are erupted first have not completed their calcification for ten months, the lateral incisors are from three to nine months completing their calcification. The first molars require four to five months, the canines six to seven months and the second molars two months. Table IV gives the details of the calcification and eruption of the deciduous and permanent teeth.

Malocclusion.—When the deciduous teeth are erupting and calcifying is the time to prevent malocclusion and attrition. Lewis and Lehman⁷⁸ have concluded from a study of observations at Merrill-Palmer School on 170 children, eighteen months to nine and one half years of age, that occlusion (the fitting of the upper and lower teeth so that food may be chewed) of the deciduous series is functional in nature and in general obeys the biological law of continuous change. They have found that occlusion is affected by growth changes and by factors influencing growth.

Thumbsucking is one of the causes of protrusion of the upper front teeth. Lewis and Lehman found that if the habit of thumbsucking has not been broken the teeth do not properly occlude and mastication is interfered with. If the habit is broken before the child is five, the child's teeth tend to resume their proper position so that "the bite" is normal.

Attrition.—Frequently even young children are seen with attrition (the teeth considerably worn). This condition has

been generally considered due to rubbing hard foods in mastication. Lewis and Lehman found in this same study of 170 children that there were only a few cases of teeth being worn down and in a large majority no appreciable amount of it. The children observed have a diet including a variety of food requiring vigorous mastication and if rubbing the teeth in chewing is the cause of attrition then these children should have had a high incidence of attrition. However, it seems possible that there may be a relation between high calcium and high vitamin diet resulting in well calcified teeth and the absence of attrition in the growing child.

The early introduction of foods such as zwieback which exercise the jaws and teeth, stimulating the circulation in the gums, all points to the presence of "healthier" teeth. It is necessary to teach the young child to chew. This should be done at an early age and it should be remembered that this is a process which is learned by the child and is not instinctive. The mistake is often made of giving sieved and mashed food for too long a period after the child's teeth have erupted when he should be taught to chew. Teaching the child to chew requires patience and close supervision on the part of the parents, and allowing food to be swallowed in large unmas-ticated pieces should not be permitted.

MEETING THE INCREASED PHYSICAL NEEDS OF THE CHILD

The problem of meeting the increasing physical needs of the child is not one that can be left to chance. The rapidly developing body, the increasing energy requirement incident to crawling, walking, learning, playing for many hours daily, all mean that the quality and the quantity of food must be chosen with these needs in mind.

There is wide variation in the practice of pediatricists in the feeding of children during this period between nine and eighteen months. Many pediatricists advocate the introduction of cow's milk, a variety of fruits and vegetables, eggs and liver before the child is weaned. Others wait until after weaning to introduce variety into the diet, maintaining a rather uniform ration of milk, cereal and orange juice.

Stuart¹⁴⁴ says: "By nine months of age the baby is usually already taking 3 simple but fairly substantial meals with orange juice and cod liver oil between." According to the table which he sets up in his book (page 187) the breakfast at this time usually consists of cooked cereal, milk and toast; the dinner of vegetable, egg yolk and milk; and the supper of cooked cereal, apple sauce or prune pulp and milk. He states further that:

"The next few months constitute a period of learning to take new foods or the same foods in less simple forms and of expansion in the amount and number of foods taken at single meals. The coarser cereals with more residue may now be used to advantage, and the vegetables may be less finely divided. Well baked potato and scraped meat from lean cuts of beef, chicken, or lamb may be given with the vegetable and potato. Egg white may gradually be offered with the yolk, bread and butter given in small amounts, and the range of fruits and vegetables expanded to include ripe apples, bananas, and most of the common greens and roots, if young and tender. It is always advisable to introduce but one new food at a time, and to give a very small amount the first few times. As to amounts, it is preferable to increase the number of foods offered during this period rather than to keep increasing quantities until very large helpings of any one are being taken. If a quart of milk a day is being given at the time of discontinuing the formula, it needs no further increase. A cup should be substituted for the bottle, one feeding at a time. No bottle should be needed after the end of the first year."

"Reasonable portions for this period may be considered to be 1 whole orange, $\frac{1}{2}$ apple, banana, or grapefruit, 3 or 4 prunes, 2 or 3 tablespoonfuls of vegetables, 1 or 2 tablespoonfuls of baked potato, apple sauce and scraped meat, 1 egg, and $\frac{1}{2}$ saucer of cereal. Cod liver oil should usually be continued during the second winter, but requires no increase in quantity over the formula period. By the end of the first year, it is usually possible and desirable to delay the first daily feeding until 7.30 or 8 A. M., and to make this the breakfast. Orange juice may then be given before or with this meal rather than at bath time. There may be only

three feedings on a 7.30 A. M., 12.30 P. M., and 5.30 P. M. schedule, or four at 7.30 A. M., 10.30 A. M., 2 P. M., and 6 P. M.

"The habits learned during these months in connection with the taking of food are of the utmost importance in determining whether future feeding will be easy or difficult, whether the child will become finicky or tractable about foods. Early weaning from the bottle, early self-feeding, avoidance of catering to taste and whim, lack of distraction at meals, and absolute regularity about meals, all contribute to good habit formation. The time to pay attention to habits is while they are being formed, and this is during the months when the child is learning to eat."

There seems to be a growing tendency in the feeding of children at this period toward greater variety in the food and more liberal amounts than formerly.

Choice of Foods.—The increased activity and the growth of the child's body during this period demand a food intake higher in calories and adequate in quality for the body needs. To supply the necessary calories cereals, vegetables, fruits are valuable.

Cereals are valuable because they are bland, easy to digest and supply not only starch but minerals and vitamins. Cereal foods which include the outer coat of the grain may make important contribution to the mineral content of the diet, especially iron, and if the germ is retained they add materially to the antineuritic vitamin B. The use of toasted whole wheat bread is desirable for the child, especially for him to learn to chew; in the later months it becomes an important source of energy as the amount of food increases in the daily food intake. Whole grain cereals are superior to finely milled ones for minerals and vitamins.

For the one-year-old child a small portion, 2 to 3 tablespoonfuls, once a day and a slice of hard bread to chew may be sufficient; the amount will vary considerably with the child. Gradually the amount of cereal and bread is increased. It is generally accepted that cereals should not exceed 25 per cent of the total calories, unless cereals are used as a main source of minerals and vitamins.

Vegetables.—Root vegetables such as carrots, beets, pota-

atoes are rich in their starch content and valuable in their minerals and vitamins but should be used moderately. Potatoes are especially desirable because they are a good source of vitamins B and C, iron, potassium, and other minerals, are alkaline in their ash content and in the diet tend to balance the acid-forming foods such as eggs, meat, cereals and breads.

Green vegetables, such as spinach, chard, turnip greens, green string beans, are low in their starch content but valuable in their vitamin A content and in their minerals. In choosing vegetables emphasis should be placed on leafy vegetables and fruit. For most children from 15 to 20 per cent of the total calories can be supplied by fruits and vegetables. A green vegetable should be a regular part of every child's food intake. A tablespoonful of sifted pulp is allowed by pediatricists to the child under a year and this amount is gradually increased to half a cupful at each of two meals as the child grows older.

Sugar.—A sugar such as cane or beet sugar or a sugar in solution such as karo syrup furnishes only energy to the body and should be used with great care in the feeding of children, especially at this age, since it has the peculiar property of blunting the appetite for foods which are necessary for growth. All fruits contain some sugar and there is reason to believe that they contain an amount adequate for body needs. In addition they are valuable sources of minerals and vitamins and contain usually appreciable amounts of cellulose which occurs in the pulp and is a desirable source of roughage.

It is held by some that because of the energy needs of children and their great activity that they need some sugar in their diet. There is available no convincing evidence that children cannot utilize the energy available in foods which are valuable sources of energy and which furnish not calories alone but body-building material as well. Those experienced in feeding children well chosen diets know that such children do not crave sweets, that they can entirely omit sugar from their diet and never feel a desire for it. The palatability and flavor of the food, the quantity served, the quality of the food and the way in which it is prepared, the appetizing appearance, are much more important factors to be considered

than increasing his energy intake with sugar. During this period (nine to eighteen months) the child may grow tired of the same cereal served every day and use of sugar is resorted to in order to get him to eat his cereal. It is better to observe him carefully and find out if substituting another cereal or reducing somewhat the amount of same cereal may not relieve the difficulty. As said before, no rule can be made absolute for all children. It is true that a small amount of sugar (1 teaspoonful for a preschool age child) at the end of a meal may induce a child to take a little more food or to take it more willingly. With well, healthy children such a bait is not necessary, and if it is resorted to should be to induce larger consumption of such foods as milk and fruit. In the diet of children at this period cooked fruits can be consumed in adequate quantity so that they are a valuable source of fruit sugar. Most of the fruits allowable at this time can be cooked without an addition of any cane sugar. Use of raw fruits should be undertaken gradually and under the guidance of a pediatricist.

Fats.—Fats are a valuable way of supplying energy in the diet. Fats which have in solution vitamin A are more desirable than those without it. Cream and butter are the best known foods supplying fat and vitamin A. Cod liver oil is not only a fatty substance giving protection against rickets through its vitamin D, but when included in the diet is a valuable source of vitamin A. It is recognized that unless there is some pathologic condition children can be given milk which contains the percentage of cream required by the Pure Food Laws. In fact, cream as it occurs in whole milk is one of the most satisfactory ways for the child to receive his fat. It is emulsified, it is evenly distributed throughout the milk and it occurs in the proportion to the rest of his intake which makes it comfortable to digest. Small amounts of butter (1 teaspoonful daily) are usually allowed as the child approaches the age of a year and a half. Most people have difficulty in remembering that butter is a more concentrated fat than cream and tend to be too generous in their allowance to children.

Quantity of Fat.—There is considerable controversy about

the quantity of fat desirable to allow young children. Some pediatricists hold that an undesirably large amount upsets the normal digestion of the child, causes loss of appetite, nausea, and prevents the absorption of calcium. Others do not subscribe to these views and feed it in fairly generous amounts. Almost all foods such as vegetables, eggs, cereals, contain larger or smaller amounts of fat and the total amount for the day may be much larger than would be apparent. In general it would seem desirable to include only a moderate amount of fat. As children grow older and become very active as much as 16 to 18 per cent of the total calories may be supplied by butter.

Use of Eggs.—Eggs are a valuable part of the child's diet during this period. Rich in growth-promoting protein, fats, minerals and vitamins A and B, they assume an importance second only to cow's milk in the diet.

Meat.—Muscle meats while rich in protein have about the deficiencies in minerals and vitamins as cereal grains and since adequate minerals and vitamins are as essential to growth and development as adequate protein and not so easy to get, it is wise to provide such foods as milk, eggs, and liver before muscle meat. Meat, scraped at first, later ground because the child has no teeth for chewing, later finely minced, is usually introduced during the last few months of this period of growth.

Liver has come to be an important constituent of the young child's diet because of its vitamin A and B and iron and copper content and the fact that it has in it certain other substances which promote the utilization of its iron by the body, especially in making red blood corpuscles.

It is unwise to try to set standards of food intake for any one child based upon observation of other children. Each child must be studied and his individual variations noted and considered in planning his food intake, although his individual variations should not interfere with his receiving an adequate balanced diet.

Those responsible for children at this period should know the amounts of different foods which normal, healthy children have been found to consume. The energy requirement of

the child at nine months is (see p. 115) 880 calories and at eighteen, 1100 calories. By the end of this period a normal, healthy child may be taking daily 1 quart of whole milk, 1 egg or its equivalent in liver or meat, $\frac{1}{2}$ cupful of green vegetable, $\frac{1}{4}$ to $\frac{1}{3}$ cupful potato or other root vegetable, $\frac{1}{4}$ to $\frac{1}{3}$ cupful fruit, 3 to 4 tablespoonfuls of cereal and 1 slice of bread, and $\frac{1}{3}$ cupful of orange or tomato juice.

Stuart¹⁴⁴ in his text includes the admirable form for constructing diets in early childhood, which follows:

TABLE V
FORM FOR DIET CONSTRUCTION IN EARLY CHILDHOOD¹⁴⁴

Breakfast.	Lunch (A. M. or P. M.)	Dinner.	Supper.
Raw fruit.	Milk or fruit juice.	Meat, fish or egg.	Milk, vegetable soup, creamed vegetables on toast, egg, or cereal.*
Cereal.*	Crackers or Bread.*	Potato.	Bread.*
Milk.		Vegetables.†	Butter, or occasionally honey, jelly, or jam.
Bread.*		Bread* and butter.	Milk.
Butter or bacon.		Milk (if not at lunch). Dessert (simple puddings, custards, jellies, etc.).	Dessert (fruit).

* Whole grain preferable.

† Usually cooked, but raw tomato, lettuce, or chopped or finely shredded carrots or cabbage should be given occasionally after child has learned to chew. Both leafy and tuberous vegetables should be included.

Food.—It is essential to provide everything necessary for the child to grow strong and also to build the right kind of foundation for the habits of a lifetime. Rose¹¹⁹ says, "One year of good feeding at the beginning of life is more important than ten after forty, and a baby's needs are not to be judged by an adult's inclinations. Feeding must be a matter of principle and not of impulse; the reward will be partly in the present—much more in the future."

It is to be remembered that the child is getting acquainted with his world and the taste of different kinds of foods which are wholesome for children is part of the experience on which he is to build his habits. It is time well spent to prepare

the foods so that they are palatable and inviting, and to vary the diet from day to day so it gives a change in consistency and flavor.

There is too prevalent a belief that if foods such as coffee, tea, watermelon, ice cream, do not make a child ill when he eats them, then they are good for him. This conclusion, however, is unwarranted. The most insidious result of the giving of such foods is the perversion of his appetite so that he does not desire the foods which are best for him.

Regularity of Habits.—Regular hours for eating, sleeping, sun baths, a nap in the afternoon (perhaps in both afternoon and morning until about twelve to fifteen months); regular bed hours for retiring, regularity of elimination, plenty of fresh air are essential to the development of a sturdy constitution, of a strong digestive tract able to stand the inevitable strain of adult life, and of good habits and attitudes toward living.

As emphasized in the discussion of the establishment of daily habits of the infant's, regularity of bowel and bladder elimination is important, since at this time in the life of the child training for the toilet is begun.

Sleep.—Some mothers report that the child at this age will sleep at least fourteen hours at night and have at least one nap during the day, sleeping for an hour. It is so easy at this period when he is emerging from babyhood to allow the nap to be discontinued and the bed hour to become irregular. ~~It takes patience and a conviction of the essential value of both to insist that nothing interfere.~~

Authorities writing their opinions in the White House Conference Report¹⁷⁶ say: "Although we cannot set up exact standards for hours of sleep, there seems to be quite general agreement that for the first three or four years of life children will take a nap during the day, and that with many children this habit of the day nap is continued to the fifth or sixth year. ~~When the nap is taken at all it is usually on the all-or-none basis, that is, the children~~ either sleep satisfactorily for the full period of time, or they do not sleep at all. Frequently children will sleep two or three times a week but not sleep the other days.

"Up to the fourth year of age the day nap very rarely interferes with sleeping at night, and if the nap is omitted it usually means a reduction in the number of hours of sleep in the twenty-four. Beyond the fourth year of age, as a rule, children should not be allowed to sleep more than one and a half hours during the day, because of the tendency to interfere with going to sleep at night. It is desirable, however, to continue the day nap as long as possible.

"A child cannot be made to go to sleep, but if good sleeping habits are established early, he will probably continue to sleep well."

IMITATION

Authorities Differ About How Imitation Functions.—There is a great deal of dispute in the field of psychology as to whether children imitate movements that they see or sounds that they hear as the result of an instinct to do so or as the result of chance learning. Most writers on child care and training, however, seem to assume that at least part of the child's tendency to duplicate the behavior and attitudes of those about him is due to a direct imitation of model. Stern and Preyer cite instances of imitation of specific sounds before their children were three months old. Several other writers give instances of direct imitation of movements before six months. "Bow-wow," mewing like a cat, "peek-a-boo," "pat-a-cake," imitative crushing of paper, throwing a ball, all are familiar in the behavior of nine-month-old babies. "Bye-bye," imitative combing of hair, kissing of a doll, scribbling with a pencil are common at twelve months.

"**Imitation of What He Sees and Hears Around Him.**—

At two years old he begins to show us our own

A little girl learned to greet everyone with gesture and the same strident-voiced

as her father used. Many mothers learn

querulous tone which creeps into their

as they hear their two-year-old child

careful imitation of the adult manner.

at Importance.—Since imitation will

it may be said in this connection that

from two years onward we find play time much occupied with "housekeeping," "traffic cop," "hospital," "shopping tours"—play in which the child duplicates as faithfully as he can the activities, gestures, tones, and other incidents of adult behavior which have happened to attract his fancy. He is rude with the rudeness of adults whom he admires, or courteous with the easy grace of the fine example of those whom he loves. He speaks clearly and accurately, or mumbles bad grammar and profanity; he is neat or untidy, quiet or boisterous, truthful or sly, at least in large measure according to his example. Whether he reproduces the behavior and attitudes of the people about him by instinct or by selected habit is not as important to our consideration as is the fact that he does reproduce. The best way to teach courtesy is to be courteous before the child and to him. The best way to teach good English is to speak it to children while they are in the early learning period of language development. The best way to teach good attitudes toward health, toward authority, toward truth, toward society, is to have good attitudes ourselves, since children reflect the subtleties as inevitably as they imitate our more obvious gestures and tones of voice.

The model for imitation may not, of course, always be the parent. It will, however, always be someone whom, for some reason, the child loves or admires. This will be the parent or nurse until the child begins to meet other people. As contacts widen, potential models become more numerous. The strident profanity of a truck driver in the street may appeal to the child as "grown-up" and prove an attractive model. The pranks of the neighborhood "bad boy" may receive so much attention and create so much excitement that they appeal to all the other children in the neighborhood as worth duplication.

It would be a mistake to protect the child from all undesirable models, for, unless he has some experience in the selection of standards, he can scarcely be expected to use good judgment in the matter when he no longer has his parents to think for him. He should not, however, be overwhelmed by too sudden or too constant exposure to undesirable models, but should rather have a gradual experience with them, being

constantly exposed to enough attractive and desirable models, either in life or in literature, to keep the balance a favorable one. Parents, being his first and his most constant models, have a great balance of power in their favor, especially if they are skillful enough to make themselves effective in this capacity.

LANGUAGE DEVELOPMENT

Passive Vocabulary Develops Rapidly at This Age.—From the age of nine months, at which time the child usually has a passive or “understanding” vocabulary of several words, he acquires further understanding rapidly, depending, of course, upon how much language he hears. At a year he understands simple statements if they are spoken slowly and clearly and are repeated: “Where is the baby’s ball?” “Give mother the spoon.” “Do you want to go bye-bye?” Most children a year old can speak three or four words, using them with correct meaning and upon the right occasions. These words are usually simple and are often repeated syllables like “ma-ma,” “da-da,” “bye-bye,” “baby,” “down,” “dog.”

Rapid Development of Active Vocabulary Comes a Little Later.—At eighteen months Gesell found that from 1 to 19 per cent of children had achieved one or two simple phrases. On the average, however, the actual increase over the twelve months’ standard in number of words spoken is small, the average number for twelve months being three words and for eighteen months being five or less. It is possible that this slowness of development is due to the fact that a great deal of energy and attention are devoted to walking at this twelve to eighteen months’ period.

A Good Model Is Particularly Important in Language Development.—A good model for language is particularly important at this period of beginning expansion of vocabulary as well as during the later more rapid increases in understanding and use of words. The young child when learning his native tongue is faced with many of the difficulties which confront adults when learning a new and foreign language. He finds his task much easier if he hears words spoken clearly and slowly, especially if they are closely associated with the object or action they express. When dressing him we may speak

of his "shoes," his "dress," his "stockings," as each is used. In feeding him we may refer to his "spoon," his "milk," his "orange juice," thus associating the right sound with its appropriate object. If we say, "throw the ball," as he throws it, or "no" as we draw his hand away from a forbidden object, we help him to associate the right sounds with their appropriate action. Practice with "where is baby's nose," "cover up your dollie," "show mother the book," provides the child with a pleasant game—unless, of course, it is overdone—and gradually extends his understanding or passive use of words and phrases which he is soon to put into active use.

SOCIAL AND EMOTIONAL DEVELOPMENT

Interests Expand Rapidly at This Age.—From nine to eighteen months the child expands his interests rapidly. He makes continuous progress toward differentiation of himself as a personality. He is no longer confused about why his toes and fingers hurt when he bumps them, or bites them, whereas the side of his bed or his rattle does not. He has extended his love from his concentration upon himself and his own needs and comforts to include his mother or nurse. It is still a self love which he gives, since it goes to the person who ministers to his wants, but it is nevertheless a concentrated and loyal love. It is wise for his father to share something of the physical care of the child in order that he may share this first expansion of love.

The Scope of Affection Widens.—Not only does the child's ego expand to include love for his parents or nurse, but to include a number of interests and things as well. It is interesting in this connection to recall James' discussion of the self in his *Principles of Psychology*.⁶⁷ He speaks of the different aspects of the self—the material self, the social self, the spiritual self. Each of these, he says, is an outgrowth from and development of an original self which expands and grows as the individual proceeds from infancy to old age. It is the social self which grows when the child of eighteen months extends his love of persons beyond himself to include his mother, his nurse, and possibly his father. By the same process of expansion his material and spiritual self grows

when he extends his scope of interests and ideas. This happens as his environment enlarges and as the skills of manipulation and investigation grow. The motor growth that occurs between nine and eighteen months rapidly increases both environment and skills, with the result that the material and spiritual selves undergo a rapid expansion.

Attachments to Toys and Other Possessions.—The word “mine” appears in his vocabulary, and because certain of his toys become part of himself he becomes attached to them, to a special blue blanket on his bed, to a particular spoon or plate. This affection for things seems fundamental; it is probably unwise to be arbitrary about depriving him of the specially cherished belongings.

There is some discussion as to whether children at this age of attachment to toys should be allowed to have the particular kind of dolls, or animal toys which, though amusing, are ugly in the eyes of adults. No scientific evidence seems available on this point, but general opinion agrees that esthetic taste can be influenced even at such an early age. It is probably not desirable, then, to give him ugly toys, the ugliness of which he may come to love because of association with them.

The child's contacts with other children should at this age be enlarged if possible. He will not yet play with them in any form of organized game, yet he will profit from contacts outside of his own immediate family circle and will find himself better prepared to make the social contacts which are so important a part of his development after two years of age. His parents and immediate family are in any case in almost complete possession of his rather concentrated love until he is at least two years old. When we recall that he is at the peak of imitative behavior at this time, and that he imitates those persons whom he loves most, it becomes clear that parents should be especially careful to be good models at this time. They should be careful not to be too anxious over minor hurts or illnesses, since they do not wish him to become hypochondriacal in his attitude toward health. They should be consistent in discipline so that he may learn what to expect. They must speak clearly and well so that he may learn to do the same. Truth, courtesy, self-control must all be care-

fully practiced by parents who wish these virtues to become incorporated into the rapidly forming spiritual self of their eighteen-months-old child.

The Beginning of His Education in Home and Family Living.—By eighteen months the child should be an integral part of the family, having at least some of his meals with them, and either a room or part of a room of his own. He can perform some of the simpler processes necessary for dressing and undressing himself if allowed to do so. He can put away his toys and keep the corner allotted for play neat and tidy. It is desirable for his own development that he be permitted to share in as many of the family cooperative undertakings as possible without overfatigue for him or strain for the rest of the family.

SUGGESTED QUESTIONS

1. Bring to class samples of (a) the motor behavior; (b) imitation; (c) the vocabulary; (d) the social behavior of a twelve- to eighteen-months-old child whom you have observed.
2. Make suggestions for meeting the play needs of the child whom you have observed.
3. Plan menus to meet the needs of a twelve- to eighteen-months-old child.
4. Discuss further what can be accomplished with young children toward teaching them about home and family living. (White House Conference will be helpful.)

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CHAPTER V

GROWTH DURING THE FIRST PERIOD OF EARLY CHILDHOOD

PROGRESS IN SENSE PERCEPTION

The Sense of Touch Is of Great Importance as an Instrument for Educating His Mind.—During this period (approximately eighteen to thirty-six months) the sense of touch is concerned with discoveries of hardness and softness, of roughness and smoothness, of warmth and cold, and with the “feel” of various textures. Children of this age are usually alert for opportunities to touch fur, a rubber raincoat, figured goods, starched cloth, silks, the woven pattern of a wicker chair—anything which offers information about how things feel. This exploration by the touch sense is more than the mere seeking of sensations which carries the fingers of younger infants over every available surface. It is now an exploration of objects as such, an endeavor to learn just what “feel” is to be associated with what “look” and what “use.” The child’s reaction to printed silk or to the pattern on linoleum is an example of this. He has learned in the past to associate change of level with change of line, the edge of a box means a drop to the floor line, etc., and is now interested to discover that in some instances change of line means no change of level; so he runs his fingers over and over the pattern printed on dress or drapery materials, and sometimes expresses his discovery when he says, “This looks rough—it’s smooth—why?”

Learning Names for Sensations and Perceptions.—We see here, too, a growth in language through which the child is achieving names for the various qualities of objects now being experienced by the senses. As we shall see later in the discussion of language growth the period from eighteen to thirty-six months is one of rapid increase in vocabulary; this association of name with sense quality is only part of the general

interest in associating the proper name with every object and experience. We must not, however, conclude that the ability to sense the quality (hardness, roughness, heaviness, etc.) is dependent upon ability to apply the right language name. Children usually learn to detect and differentiate such qualities accurately before they can name them, and, conversely, often learn the names "big," "hard," "red," "heavy" before they can apply them accurately to the proper sense experience.

Acquaintance with His Own Body.—Perception of the extent and contour of his own body has occupied the child for some months before he is a year old, and seems to be fairly clear to him by the time he is three years old. He lies in his cradle when he is four or five months old, touching the fingers of one hand against those of the other, enjoying the sensation he thus gets. By seven or eight months he has learned to get his toes into his mouth, but still has to learn that when he bites those toes he gives himself a sensation because the feet belong to him. Sometimes he bites a finger or a toe, then bites a rattle, studying the difference, and learning that toes and fingers are part of himself whereas rattles are not. Before he is a year old he has begun conscious exploration of his own body, studying its extent, exploring its contour. He pats his own head, fingers his own ears, rubs his own stomach. Not infrequently he discovers that some parts of his body give one type of sensation, some parts another. He may discover at a year or at eighteen months, sometimes at two or even at three years, that patting or rubbing the genital organs produces a particularly pleasing sensation, and will return to exploration of this part of his body even more often than to his play with ears or toes.

Attitude of Adults Important Here.—Our attitude toward this activity will determine in large measure how often he returns, and to what extent his passing interest will become fixed as a habit. If we become anxious, conveying to him that he has discovered a particularly significant type of behavior, he will reflect our own attitude of importance toward it, will return to it more often, and give it more attention than he otherwise would. If, on the other hand, we regard the behavior as part of the general exploratory behavior so

characteristic of the ages from one-half year to five years, he will more than likely so regard it, and will soon forget it as his interest shifts to the next natural activity. We may, of course, treat the behavior like any other piece of undesirable behavior, pulling at his ears too constantly, playing with the ink bottle too persistently—we may distract his attention by giving the hands more entertaining things to do, and we may clothe him or tuck him into bed in such a way that the genital organs are not easily accessible to him. Anything we do, however, to fix his attention on the behavior or to attach vivid significance to it serves only to deepen the impression and to defeat the end we have in view, namely, to allow him to forget it and to lead his interest into more acceptable activity.

Learning to Understand Sounds.—The development of perceptions of sound is rapid from eighteen months to three years of age. The child during this period learns to identify countless sounds that have not heretofore held meaning for him. Doubtless his growth in this respect seems more spectacular than it really is because his vocabulary increases rapidly at this time, so that he may appear to be learning for the first time meanings which he has learned before but can only now express. In any case, he seems to be acquiring understanding of the sound world about him at a spectacular rate.

Probably the most interesting expansion of his understandings in sound takes place in the field of language, where the child is acquiring a passive vocabulary (of words understood) even more rapidly than he extends the active vocabulary (of words which he can speak).

Interest in Music.—His interest in and ability with music also increases rapidly at this age. Although there are tremendous differences among individual children in capacity to enjoy and to respond to music, most children of three years have learned to recognize a few simple tunes, can beat a fairly good simple rhythm, can detect the difference between high notes and low ones, between slow and rapid rhythms, and between loud and soft intensities in music. Some children can also sing simple melodies. In this, as in all other aspects of learning, skill depends not only upon original endowment but upon opportunity to learn as well. In some homes where

children hear a great deal of music, sharing it with people who appreciate it, they learn a genuine appreciation at an early age. There is danger here, as elsewhere in learning, that an appearance of appreciation and interest may be forced because it is constantly expected. Artificiality is no more desirable here than anywhere else in character growth.

Learning to Judge Sizes of Objects.—Perception of size as a skill is becoming much more accurate from eighteen months to three years of age, but is still inaccurate enough to prove difficult to the child. For children from one to five years old Madame Montessori⁹⁴ has designed many types of equipment especially adapted to train the senses. Among them are several for training perception of size: Sets of cylinders varying in diameter but not in depth, in depth but not in diameter, and one set which varies in both dimensions; a set of blocks which if arranged in graded size builds a broad stair; and another set which if piled in order of size builds a pyramid. Nests of hollow cubes varying in size so that they may be fitted inside of one another make an excellent toy for training the perception of size, and are of great interest to two-year-old children.

While riding his kiddie car or tricycle the two-year-old child must learn to judge the width and length of his vehicle in proportion to the width of an opening through which he wishes to take it. If given sufficient practice he can, before he is three years old, become expert enough to avoid scratching vehicle or furniture. At eight months one of Koffka's subjects, while waiting for his bottle, was shown a doll's bottle about one fifteenth the usual bottle size. The baby reached for it as eagerly as if it were his own bottle. The child makes few such mistakes with objects after he is three years old, yet some months after he has learned fairly accurate judgments of objects he can still be seen trying to sit on a tiny doll's chair and looking surprised when it fails to support him. Since he sees himself least and has less opportunity to judge his own size in relation to other things, he can still be seen making mistakes in judgment of his own size even when he is well past his fourth birthday. One very intelligent child of five looked surprised when he failed to step over a three-foot

chicken wire fence with the same easy gesture that had carried his father over it.

Perceptions of Shape.—Judgments of shape are progressing rapidly during the ages from two to five. An eighteen-months-old child can discriminate between pictures of familiar animals, and will say "bow-wow" when he sees the picture of a dog, or will crow upon seeing the picture of a rooster. He interests us, however, by the fact that his perception of detail is of so little importance that he recognizes these pictures as readily upside down as rightside up. The two-year-old child is just beginning to have an appreciation of the difference between a triangular, a circular, and a square block if all are about the same size. If allowed to play with the pans in the kitchen cabinet he may try to make a triangular cover fit a round pan, or a square pan fit inside a round one. He could not, by the way, have a better set of equipment for teaching size, shape, weight, and motor coordination than the pans from the kitchen cupboard. Nor could he be provided expensive toys that would teach these fundamental lessons better than the empty coffee cans, oatmeal cartons, discarded spools, and other equipment offered by even the simplest home.

In this connection we must remember once more not to confuse the child's ability to name "square," "round," "oblong" with his ability to actually see and appreciate the differences in contour which these terms represent. To perceive shape is one thing; to name it quite a different thing. It is with the perceiving that we are concerned now, with providing him numerous "shape" experiences so that he may learn to recognize everyday objects by their shapes, as well as by their sizes, colors, weights, and so on.

Equipment to Aid These Learnings.—Montessori⁹⁴ has formal equipment to aid in teaching about shape as well as to aid in teaching about size, and much can be done in formal teaching with such equipment; but children were learning judgments of size, of shape, of weight, etc., centuries before it ever occurred to anyone to teach them formally. We must be careful to avoid the error of concluding that these fundamental learnings would not take place without formal teaching.

Learning about Colors.—Perception of color occupies an important place in the child's interest at this age. Dearborn³¹ reports that as early as the three hundred and forty-fourth day his child took great delight in the colors of sunset clouds. It is possible, of course, that the delight in this case was with brightness rather than with color, although Dearborn says that his child rarely confused the names of red, blue, yellow, and black at nineteen months. Most authors agree that colors as well as brightness are recognized at about thirty months of age. This does not mean that children name colors at this age without a great deal of coaching; it means, rather, that they have learned to discriminate between colors so that they can match saturated colors accurately. The primary colors (red, yellow, green, blue) can be named correctly by average children of five years.

There have been many studies of the color preferences of infants and of school-age children, the results of which agree fairly well. In general it has been found that infants prefer yellow or red, and that older children prefer blue. There has been, however, very little work done in the study of the color preferences of children of the preschool age, only one or two studies being available. Munroe⁹⁶ studied 1612 paintings obtained from 138 children ranging in age from two years to four years and eleven months. She found that the two-year-old children showed a marked preference for yellow, and that the three- and four-year-old children preferred red, the four-year-old group preferring it less markedly than the three-year-old group. These studies make it appear that infants prefer yellow, and that the preference shifts, with increasing age, through red to blue.

Color naming, as we have said, seems a different matter from color discrimination and color preference. Munroe found that preschool children name blue with the highest percentage of accuracy, that red is a close second, and that naming of green and yellow follow in order. The most frequently used color name, regardless of correct application, was blue.

Learning to Judge Weights.—Accurate perception of weight depends upon judgment of size and knowledge of the weight of various materials, as well as upon maturity of nerve cen-

ters. Big objects ordinarily weigh more than small ones, although a large bag of feathers often weighs less than a very small bit of lead. Young children often find confusion because weight varies with the material of which the object is composed as well as with the size of the object. At Hal-lowe'en time one group of four-year-old children, having played for a day with a paper maché pumpkin which closely resembled a real one, were presented with a real pumpkin. One of the children reached out his hands to accept the gift, but made a muscular adjustment sufficient to hold only the paper pumpkin with which he had played the day before. This was, of course, insufficient to sustain the weight of the real pumpkin, which he dropped. All of the children seemed as surprised as he when they came to lift the real pumpkin, and asked many questions about the reasons for the difference in weight between that and the one they had played with the day before. Even at four years of age they had not yet learned enough about judgment of weight to avoid such an incident.

Imperfect Judgments are Often a Source of Trouble for Young Children.—Two-year-old children are faced many times a day with situations as puzzling as this. They reach to pick up a pail with the same free gesture they have seen an adult use, and are astonished that they cannot lift it. They learn about how much muscular pull is necessary to lift a pail of sand, and make the same sort of muscular adjustment to lift a rubber ball of the same size. It is not at all unusual to see a two-year-old child upset himself because he has prepared to lift a heavy object, only to find himself lifting a light one. Often he attempts to lift things he cannot move at all. One day he seems to have discovered that big things are the heavy ones and little things are light, only to find that some big thing upsets him because it is light, and some little thing cannot be moved, no matter how hard he tugs at it. Many times he must conclude within his own thoughts that he lives in an arbitrary world at best.

A two-year-old child has a widely increased environment available to him through his newly acquired motor skills; he has an appetite for control over objects stimulated by his grow-

ing skill in control over his body and especially over his hands; yet he finds himself confronted with inability to judge sizes, shapes, weight—an inability which often interrupts his projects, gives him many bumps, peoples the world with objects which seem to him arbitrarily bent upon teasing him. It is slight wonder that two-year-old children suffer a brief period of temper tantrums almost as surely as they become two years old.

LANGUAGE DEVELOPMENT

This Period Is One of the Most Important to Language Development.—From eighteen months to two years there is a remarkable increase in language power. This increase has been measured by two types of studies: One type which studies increase in vocabulary and skill in language form, and another which studies content of speech. Gesell⁴⁸ and Smith¹³⁸ have given us two studies of the former type, while Piaget¹⁰⁶ and McCarthy⁸² have studied content.

Studies of Vocabulary and Form.—Gesell found the average vocabulary of eighteen-months-old children to be less than 5 words. At two years, however, his children (50 in number) could meet rather exacting tests in language involving the use of pronouns, color names, etc. He found that 60 per cent of them could use complete sentences; 48 per cent could use the pronouns “I,” “you,” and “me” correctly; 42 per cent could use plural forms; and 40 per cent could use past tenses of verbs correctly. This progress in language continues steadily. From three to five years of age children are engaged in learning to use prepositions appropriately, to employ descriptive words accurately, and to deal with larger units of thought. “Indeed,” Gesell says, “before five years of age, within his limits, he (the child) becomes an entertaining raconteur, whereas four years earlier he was unable to articulate a single word.”

One of the most thorough studies of vocabulary growth which has been made was done by Smith at the University of Iowa. She studied the vocabularies of 273 young children and found that at one year the average vocabulary is 3 words, at two years the average vocabulary is 272 words, at three

years the average vocabulary is 896 words, at four years the average vocabulary is 1540 words, at five years the average vocabulary is 2072 words, and at six years the average vocabulary is 2562 words. According to this study children acquire about 270 new words during the second year, most of which, if we accept Gesell's figures for the eighteen months' level, are learned between eighteen and twenty-four months. This seems to set the pace for later learning, since Smith's figures show an increase of over 600 words during each of the third and fourth years, of over 500 during the fifth year, and of almost 500 during the sixth year.

Children of This Age Use Much Language in a Single Day.

—Brandenburg¹⁷ and Nice¹⁰¹ have studied the total language responses of children during a single day. Brandenburg found that a three-year-old child used 11,623 words during the day, and a four-year-old child used 14,930. The three-year-old child used 37 per cent of his total vocabulary in one day, and the four-year-old child 23 per cent. During his waking time the child was linguistically inactive only nineteen minutes, the longest single period of linguistic inactivity being four minutes. These figures give some understanding of the amount of practice devoted to language at these ages.

Mastery of Sentence Structure Also Proceeds Rapidly.—

At eighteen months only simple sentences, if any, are used. At four and one-half years complex and compound sentences are used but constitute only a small portion of the child's conversation. Before six years of age a child whose language growth is normal has command of practically every form of sentence structure. When we consider that command of such a variety of sentence forms means that the child's command of the mechanics of language is nearly complete, we can appreciate something of the amount of language learning that has taken place during the preschool years.

Studies of the Content of Children's Speech.—The content of a child's speech is significant not only as a measure of his language growth but as a measure of character and personality growth as well. Piaget¹⁰⁶ studied the language of two children in Geneva and has published one of the most comprehensive analyses of the language content of young children. He finds

two distinct classifications of language as it functions in relation to thought, namely, egocentric speech, and socialized speech. Egocentric speech is speech which has no social function, such as the monologues which accompany action or which verbalize fantasies, and the soliloquies which take place either when the child is alone or when he is with others, but which are addressed to no one, and are not intended to give information or to solicit an answer. This egocentric speech is a primitive and infantile type of language which, according to Piaget, occupies approximately 50 per cent of the total speech of young children, and still plays an important part in the speech of six-year-old children. As the child matures he gives more attention to socialized language, going first through a stage of "collective monologue" in which he talks aloud to himself before others, not talking to anyone in particular but nevertheless being conscious of the audience. The content of such speech is equivalent to the content of the pure monologue, since the child is simply thinking out his actions aloud with no desire to give anyone any particular information.

McCarthy,⁸² using a classification similar to, although not identical with Piaget's, found egocentric responses occupying only 10 per cent of the speech of children between eighteen and fifty-four months of age, with a decrease in the later years. This wide discrepancy from Piaget's figures may be due to errors of sampling, to a difference in method of collecting and analyzing data, or to a difference in the social backgrounds and discipline of European and American children.

Language Develops by Fairly Definite Stages.—What seems significant from these studies is that children seem to pass through definite phases of growth in language. In reading about the subject we see frequent references to a "babble stage," a period of "echolalia" (repetition of all speech heard), "egocentric speech" or "monologue," a "naming stage," a "why, when, where, what" or "question-asking stage," etc. The babble stage was explained earlier as a period of practice with the use of the vocal apparatus. The period of "echolalia" is one in which children echo after us everything we

say to them. It is an excellent device for making immediate use of a model while it is still fresh in memory, and should be regarded as such rather than as an aggravating technic by which children delay answering questions or carrying out commands. The "naming stage" is one in which the child attempts to learn the names of objects, of people, of colors, or descriptive adjectives, in fact, of everything possible. "What's your name?" "What's this called?" "What color is that?" are attempts to learn the names of things. We can help the child a great deal at this stage by giving him correct and clearly-spoken names for commonplace things.

Practice Important Here as in All Learning.—The following sample of the conversation of a two-year-old child at the dinner table shows how practice with names as well as with sentence structure is achieved. It serves also to demonstrate the tendency at this age to lapse into monologue. Peter is given his dinner. He asks, pointing, "What's that?" The answer is, "Potatoes." Peter echoes, "Yes, tatoes." Then, "What's that?" Again he echoes the answer, "Spinach." "What's that?" This time he echoes the answer and practices the others, pointing to the appropriate object in each case; "Liver, tatoes, spinach." He begins a monologue: "This is liver. This is tatoes. This is spinach." Then he adds practice with sentence structure. "Petah eat his liver. Petah eat his tatoe. Petah eat his spinach." This monologue with variations persisted throughout the meal, so that Peter practiced the words "liver," "tatoe," "spinach" well over twenty times each.

The "question-asking stage" is sometimes regarded by parents as amusing, sometimes as annoying. Occasionally it is regarded as it should be, namely, as a serious effort to extend vocabulary and to gain information. Its possible abuse by the child is discussed elsewhere. Brandenburg found that in a single day his three-year-old child asked 376 questions and that his four-year-old child asked 397. Most of these questions are attempts to gain information and to clarify the hazy territory between reality and imagination, but are sometimes attempts to seek justification for an act or an idea.

Some Questions Are of Especial Significance.—Among the

questions which are usual to three- and four-year-old children are questions about sex, about death, and about God. "What is the difference between little boys and little girls?" "Where do babies come from?" "What does it mean to die?" "What is God like?" are almost inevitable questions during the period of widespread interest in words and in facts. The child has much difficulty with "Mr." and "Mrs.," with "Yes, mam" and "Yes, sir," with "him" and "her," and with "he" and "she." It is to be expected that in the course of his inquiries about everything that interests or puzzles him he will ask what essential difference divides the world so obviously; hence the question, "What is the difference between boys and girls?" Or, again, a new baby may arrive or some one may die in the child's own home or in the neighborhood. We must not regard the child as morbid, but rather as intelligent if he asks "where" or "what" in such an instance. We answer many of his other questions with "God made it," or "God takes care of that"; we must not think him irreligious if he asks "Who, or What is God?" These questions, like all his other questions, should be answered truthfully, simply, and without sentimentality or tense emotional accompaniment. Sometimes, of course, in order to answer truthfully we must answer that we do not know, but this answer must never be allowed to substitute for information which we do have and which we should give the child in simple form as soon as he is interested enough to ask for it.

The Child Makes Many Uses of Language.—In addition to using language in order *to secure information*, children use it almost from the beginning *for the purpose of giving commands or expressing wants*. "Go bye-bye," "Mine," "Bobby wants a drink," are examples of this.

Soon, however, language begins *to serve the purpose of simple narration*. The child tries to tell things that happened to him or that he has imagined. At first these narratives are extremely simple. One two-year-old child who had witnessed an accident in which there had been a good deal of excitement told breathlessly that "Bobby falled out of the bus," but could give no further detail when asked if Bobby was hurt, or who had come to help. His only answer

to any question was reiteration of the statement, "Bobby falled out of the bus." At three years these narratives become somewhat more detailed. An occasional three-year-old child can tell a fairly well-connected story: "I went to Grandmother's house. She lives on a farm. I saw pigs and chickens and a baby cow. Grandpa said it was a calf. It walked funny, like this," whereupon an apt demonstration of a wobbly calf-walk is given.

Imaginative elements often creep into these narratives: "I saw a big, black bear. It was in the yard by the lilac bush." Such statements should not be disciplined as untruths, but should be regarded as natural play of imagination and treated in the spirit of play. If direct falsehoods persist and come to be used to escape responsibility or to achieve selfish ends the situation is different. When such situations arise they should be dealt with clearly in order to keep the child from developing a habit of falsification for selfish ends.

At four years imagination can produce a whole original story: "Once there was a great big engine, and it used to come right up to Bobby's door (the story was told by Bobby to a nursery school group), and said, 'Puff, puff, come out, Bobby, and I'll take you to visit your grandma.' And Bobby went out and climbed in the engine and it started out. 'Puff, puff' it went all the way through the woods right up to grandma's door." The story goes on to describe how Bobby visited grandmother, received cookies (a fact doubtless borrowed from reality), found the engine waiting, and returned home. This story was repeated many times with a wide variety of embellishments. Sometimes the engine not only talked but waved goodbye as well. The tendency to animate objects is characteristic of the imaginative narrations of young children.

The Importance of Stories.—Many children who do not use narration as an outlet for imagination, take great delight in repeating stories that have been read to them. Their memories are often capable of carrying the wording of quite long stories, which they recite with an exactness that sometimes deceives us into thinking that the child is reading from the

page. This delusion is augmented by the fact that children sometimes remember even the exact word at which the page should be turned. These recitals are often carried off with a surprising feeling for dramatic effect. The real test of narrative skill, however, lies not in the ability to hold the attention of adults with a story, but rather in the ability to hold the attention of other children. Adults have ability and willingness to understand, even when enunciation is indistinct, the plot sketchy or indifferently pursued. Children, on the other hand, will not listen unless enunciation is distinct, and the plot entertaining, consistent, and well developed. In many ways children furnish each other with motives for real effort in language performance which adults can never furnish. This gives another reason why young children should play at least part of the time with other children and should not be isolated entirely with adults.

During the narration period of language development children should hear a variety of good stories which can serve as models. There is a good deal of discussion in the literature of child care and training as to whether children should hear fairy stories or not. Certain children of the unstable, introvert type may be frightened by the more bloodthirsty fairy stories like Jack the Giant Killer. Other children of the same type may find in fairy stories still further material for imaginations already overstimulated. On the whole, however, children, particularly those of the stable and extrovert type, are unharmed by the traditional fairy stories, and on the contrary usually derive a great deal of joy from them. Probably no writer, however, would recommend a steady diet of fairy stories. Children are too easily and too profitably entertained by stories from everyday life to permit neglect of this rich field. Simple stories about little boys and girls who get up cheerfully in the morning, go to the bathroom and brush their teeth, drink a glass of water, take off their night dresses, and so on through the routine of the listener's day will engage the attention of nearly all children from two to four or five years of age. Much that is worth while can be injected into the story by

way of an example or moral, but moralizing should never be overdone lest it lose its value.

The Most Difficult Use of Language Is for Expressing Thoughts and Reasoning.—Probably the last use that the child makes of language is expression of thought or reasoning. Part of the explanation for this is doubtless that, although children can reason enough to solve some of their own problems at an early age, they do not often give evidence of the type of abstract reasoning that needs to be expressed in language. Many people think that unless the process of reasoning is expressed in language no reasoning has taken place; but to people who know children it is often evident that reasoning has occurred when the child goes to a certain place to get things, or when he builds blocks in a certain way, or when he has in some simple piece of behavior demonstrated that he is capable of solving problems and of relating cause and effect. However, the more subtle aspects of abstract reasoning do not usually manifest themselves in gross motor behavior, but take place by way of language. Language offers great difficulty to people of any age whenever it is called upon to express the lights and shades of an individual thought process. It is not to be wondered at that children find language useful as a means of giving commands or telling narratives earlier than they find it useful as a means of expressing reasoning.

In spite of the difficulties involved, however, three-year-old children are beginning to express in language ideas and simple reasoning. One child of three wanted to know, "Where does the milk go when I drink it?" and another said, "I can't wear holes in my stockings when I'm sitting on Daddy's shoulder." Another child of this age upon being told that God made everything and everybody said, "Then, who made God?"

At four years reasoning or thinking is expressed much more clearly. One four-year-old child stood gazing out of the window on a windy day. After a thoughtful pause he said, "Trees moving; wind blowing—trees moving make the wind blow." This is false reasoning, but clearly expressed nevertheless. Another four-year-old child, the son of a minister, over-

heard several children asking to have the light turned on in a room which had become dark. He said, "God is Light; God is everywhere; we don't need the light turned on here."

Causes for Language Retardation.—There are several reasons why a child of two and one-half or of three years may have failed to make a good beginning in language development.

Deafness.—Probably the first thing to do in seeking the cause for retardation is to examine the child's hearing. It is not always easy to be sure whether or not a child is deaf enough to prevent his hearing conversation and hence to prevent his profiting from the guidance of models in his language learning. Children are extremely quick to compensate for defects of eyes or ears, and may carry serious handicaps for a number of years without the knowledge to themselves or to adults that they are different from other children. The child fails to realize his handicap because, never having seen or heard well he does not realize that he could be or should be different. The parent fails to discover the difficulty because the child, being nearsighted or deaf learns to compensate for his deficiency by extra alertness in his other senses. Even supposedly expert examiners sometimes have difficulty in diagnosing sensory defects because special methods for examining very young children are not yet widely known. Every effort should be made, however, to determine whether or not language retardation is due to defective hearing.

Defective vocal apparatus is sometimes responsible for inability or unwillingness to attempt speech. Occasionally the trouble lies in the nerve centers which control speech. Rarely the difficulty is one known as *word deafness*—a defect in which although sounds are heard, the associations necessary to lend meaning to word sounds cannot be formed.

Mental retardation is in many cases the cause of retardation in language development. Many studies of the relationship between general intelligence level and acquisition of language have been made, but the exact degree of association is difficult to state. All studies of feeble-minded children show language retardation, while all studies of superior children

show language acceleration. It is safe in this connection to assume that children who talk unusually early are probably superior mentally; that feeble-minded children are always late in talking; but it is not to be assumed that all children who are late in talking are feeble-minded.

Inadequate or Defective Model.—Some children of average or even of superior mental capacity are late in talking because they do not have a model which is adequate in amount or in kind. It is a matter of common observation that children who live in institutions for dependent children during the first three years of life are slow to acquire language no matter what their intelligence may be. Wooley's¹⁸⁸ case-study *David* is an excellent example of this sort of handicap. David, a child of normal intelligence, at two years and ten months could speak only one phrase, "good morning," and understood little else. He had until this age been in an orphan asylum where he received good physical care, but where no one had time or inclination to say anything more than "good morning" to the children.

On the other hand, children of superior inheritance and general intelligence are often slow to talk because they are cared for by nurses who do not appreciate the need of talking to their charges, or who, when talking, are limited in expression and often use bad grammar. The marked accents of foreign-born nurses offer another handicap. Add to this the fact that children of wealthy parents seldom have free play contact with other children, and no other explanation is needed to understand why such children are frequently slow in language development.

Occasionally the model for language is at fault because there is too much of it. Parents or nurse may speak too rapidly for the child to isolate from the general flow of conversation any specific and understandable words or phrases. Reasonable speed and clearness of enunciation are essential when addressing young children. In the anxiety to give enough model to their children parents sometimes err by talking too constantly, thus bestowing upon the child such incessant attention that he learns to expect to be the "center of attraction" at all times; or, if this is not the result, he

may become overstimulated and overfatigued—a condition which handicaps rather than facilitates any type of growth.

No Need to Learn.—Occasionally children do not learn to talk because they do not need to learn. They receive such constant attention and affection that they have no occasion to learn it, and their wants are so constantly anticipated that no need to express wants verbally arises.

Limited General Experience.—Some children have enough need for language to help them develop the type of language by which they express wants, but are so limited in general experience that they have nothing to express in narrative, and are lacking the knowledge of perceptions and judgments which provides material for reasoning. A fairly wide general experience is necessary if the child is to have a desire to express himself and his relation to the world about him. The richness and variety of his vocabulary, the fertility of his ideas, the accuracy of his expression all depend upon the richness and variety of his experience. A home which is rich in language model and in varieties of experience usually provides a desirable background for language growth.

Too Much Urging or Coaxing.—Occasionally parents are overanxious for evidences of development, forcing the child beyond his ability or rejoicing too enthusiastically over his successes. If a child is urged beyond his ability, realizing that more is expected of him than he can give even though he makes his best effort, he soon becomes discouraged and may sullenly refuse to try because he would rather have it appear that he “won’t” than that he “can’t.” Children need praise for their efforts, for if reproof and correction alone meet their attempts to speak, it is evident that they are likely to stop trying. On the other hand, if too great praise attaches to effort, if rejoicing takes the form of making the child repeat the new word or phrase over for every newcomer, he may become self-conscious or inhibited in his attempt to use the partially formed skill. Sometimes, in this situation, however, he becomes, not self-conscious, but a tyrant. If too great importance attaches to his every word he may become conscious of his power over his parents, feeling that he can control their happiness by speaking or by refusing to speak.

Ridicule, Nagging, or Other Emotional Tension May Produce Stuttering.—Laughing at the child's "cute" accent or his imperfect pronunciation is particularly dangerous since children are unable to discriminate kinds of laughter and do not always know the laughter of indulgent amusement from that of mockery. Ridicule is feared and hated by young children quite as much as by adults, and a suspicion that the laugh is at his expense may in one dramatic experience kill much of his joy in language. Self-consciousness or fear of ridicule as a rule produces one of two results: Either it discourages effort and tends to produce silence, or it provides one of the commonest causes of stuttering. The motor control which regulates speech is the finest in balance of any motor control in human behavior; it is the most easily disturbed. Any tension, any shock, any self-consciousness, fear of ridicule, fear of failure, may upset this balance. Stuttering may result from a death in the family, financial strain in the family, overfatigue, the pain or shock of an accident to the child, fear of too severe discipline, unhappiness, emotional conflict or strain of any kind. When due to such causes it can be cured only by removal of the inciting cause. Nagging the child, or calling attention to his difficulty can only make him more self-conscious, and more tense, and can, therefore, not cure, but only aggravate the difficulty.

Severe illness, the shock of an accident, the strain of death, worry, or unhappiness anywhere in the family may not only produce stuttering but may temporarily inhibit total language progress. One child of two years, already in possession of ability to use phrases and short sentences, stopped talking for over a year when his four-year-old sister died. Whether this was due to his own grief or to a reflection of family tension could not be determined, but it is probable that had the family been able to control their anxiety over his silence it would have lasted only a few days or weeks. Their worry over his difficulty seemed to convey anxiety to him and to block his efforts to speak. Not until the whole emotional tension could be relieved did the child recover from the fear of failure which had grown out of all reasonable proportion and which completely inhibited his motor speech reaction.

Changing Handedness Questioned as a Cause of Stuttering.

—Stuttering and retardation in language are sometimes attributed to attempts to change children from left-handed to right-handed motor performance. This is, however, a matter much in dispute at the present time. Neurologists are agreed that the tendency to be more skillful with one hand than with the other is not due to habit alone but to an inherent superiority or strength in one half or the other of the central nervous system. According to the group of specialists who associate stuttering with a forced change of handedness the extent of disturbance in speech is correlated with the strength of the original handedness and also with the resistance which the child makes when change is insisted upon. Orton* states that only a small percentage of children can be trained to use either hand without nervous or emotional disturbance. All the others have a decided "cerebral dominance" which makes the use of one side or of the other so urgent that interference with the natural preference will produce nervous strain. He claims that 13 per cent of all cases of stuttering can be traced to interference with a tendency toward left-handedness or to interference with natural cerebral dominance.

This claim is not corroborated by other writers, particularly by Fletcher³⁹ who denies the importance of handedness as an explanation for stuttering. Most writers in child training, however, would agree that it is unwise to force the use of the right hand if the child seems persistently awkward in its use and especially if attempts to change meet with vigorous resistance.

MEASURING THE GROWTH OF CHILDREN

It is a much discussed question among the anthropometrists (persons who measure the human body) as to which measurements most faithfully represent the growth and development of the individual. Various investigators urge the use of one measurement or the other as most significant.

There are groups of investigators doing valuable research to find if measurements other than linear ones cannot be made which will more satisfactorily represent growth. Some

* From a lecture given at the Merrill-Palmer School, May, 1929.

authorities hold that the girths of shoulders, hips, chest in their relation to linear measurements are most significant. They hold that the trunk measurements are most important since in it all the most important functional activities, such as digestion, respiration and circulation, are centered.

Linear Measurements.—Linear measurements such as standing height, recumbent length (the body being in a supine position), and stem length (the length from the head to the buttock), are those now in general use. Some authorities hold that standing height is most desirable since it is the position in which the body is usually carried. Others hold that recumbent length is a truer measure because the posture defects such as forward head, forward shoulders, eversion of the legs, marked lordosis (hollow in the back), are obviated by the supine position and there is the possibility of a comparison of length from month to month in which many of the factors are constant.

Disadvantages of Linear Measurements.—It is true that alteration in the length of the legs and arms may be induced by inadequate amounts of certain internal secretions, or an unbalance of the internal secretions and such pathologic conditions, as rickets. Dr. Lydia Roberts has made the statement that "Disease of endocrine glands may affect the length of the legs, making them longer or shorter than normal, depending on the particular gland concerned; the bowlegs of rickets markedly shortens the height of the child, and less specific nutritional disturbances may perhaps alter appreciably the length of the child's legs and thereby his height." The following statement made by Hrdlicka and quoted by Gray⁵¹ (p. 415) seems to be of especial significance: "When I compare my sitting height indexes with similar indexes obtained by Dr. West,¹⁷⁴ it appears that the indexes of Dr. West's children were at all ages somewhat smaller or that the lower extremities in these children were at all ages somewhat longer than they are in our children in the asylum. . . . These figures make me think that it is possible that it is in the lower extremities where lies the principal defect in the growth of the badly nourished children; but I can say nothing positive on this point!" Gray found that the private school boys whom

he studied surpassed public school children, and still more asylum children of the same age, not only in standing height and in sitting height, but also in relative length of leg; that is, they had longer legs for their height than less fortunate children.

Are Actual or Proportional Values Most Satisfactory for Measuring Height and Weight?—It has been shown that physical measurements may be examined in two ways: Actual values and proportional values. Some authorities hold the proportional value between body measurements is more significant than actual value, and the relation of stem length to total recumbent, weight to height, chest girth to standing height, chest girth to weight, are the values to be emphasized.

As early as 1922, Gray had written of the ratio of length of the body trunk to standing height as the gage of body build. Gray recognizes three types of stature, one in which the trunk is preponderant; a second or opposite type with long legs, and a third or intermediate type.

West and Hrdlicka were no doubt the first to use sitting height index as an index of body build among growing children.

Are There Growth Cycles?—Robertson has indicated that there are large oscillations or waves of growth in children which he has termed "growth cycles." In man he thinks there are three such cycles, each cycle beginning with a period of relatively slow growth followed by a period of very rapid growth and terminating in another period of slackening. The first cycle is the infantile growth cycle, the second the juvenile growth cycle, and the third the adolescent growth cycle.

According to Robertson¹¹⁷ the most satisfactory indication that growth is proceeding normally is shown in the altering of the body proportions. He holds the proportions only change as the body develops and not necessarily with the age of the animal. As an example of these changes he cites the notable decrease in the relative magnitude of the head in proportion to the trunk and a relative lengthening of the extremities, particularly of the legs. Robertson refers with interest to the question of whether or not there is a similar period of relative instability of the growth process at the juncture of the juvenile and adolescent cycles, and also

whether specific infections, abnormalities of development, etc., exhibit preference for the one or the other period of instability.

Seasonal Variation in Growth.—The White House Conference Report,¹⁷⁶ *Growth and Development of the Child*, Part I, p. 249, says of seasonal variation in growth of children, "Statistical studies reveal a seasonal periodicity of growth in children. Porter has shown, from measurements of thousands of Boston school children, that the months of July to December are especially favorable for growth in weight. The most rapid gain was found to occur from September to January, the average gain during the period being four times that during February to June.

"In Johannesburg, Transvaal, South Africa, where the seasons are reversed, Cluver found a corresponding reversal in the period of rapid increase of weight of infants. The infants gained nearly twice as rapidly in the cool months, April to September, as in the warm months, October to March.

"Nylin's observations are of special interest. His evidence indicates that school children in Spanga and Stockholm, Sweden, grow fastest in height in spring, but gain in weight most rapidly in late autumn and early winter. Thus when the children gain in height their growth in weight is retarded, and *vice versa*. On the whole, the weight increase seems to vary inversely with the height increase. Nylin does not agree with the prevailing view that the seasonal variations in growth are due to variations in the water content of the body. Although he appreciates the influence of sunlight upon growth he points out that his findings do not confirm this connection and that further studies into unidentified endogenous factors are needed in order to clear the situation."

Increases in Height and Weight.—During the period from eighteen to thirty-six months the child is making as marked growth physically as he is emotionally, mentally, and socially. The increases in height and weight are much less dramatic than in babyhood, but deserving of as careful observation as the earlier periods.

The difficult problem is to get some standard by which to measure the rate of growth and the expected increase in weight

which will make adequate allowance for individual differences and serve as a guide to those responsible for the child.

The questions parents ask, "is he growing as he should," or "is his rate of growth satisfactory," "how does he compare in height with other children of the same age and sex," "how does his weight compare to others of the same height and sex."

Every child is different and there is reason to believe that within a certain range he may vary definitely from the average for the group and yet be normal, healthy, and meeting the laws of his own growth curve.

Measurement of Growth by Standing Height.—Standing height was the first measurement to be used extensively. This is the measurement used in the standards set up by the United States Children's Bureau and their tables have been of great value in stimulating public interest in the measurement of growth and giving a general guide.

These standards have been obtained by measuring large numbers of children of all ages and computing the average height and weight for each age group. Few children of any age group, however, are of exactly the average height of that age group. They scatter about the average figure, most of them measuring within an inch or so of the average height, but a few being several inches taller or shorter than the average figure.

Comparing a Child with His Own Group.—It is no doubt of greater value to compare children in a certain group with standards obtained from the same or a similar group of children rather than to compare individual children to such a widely unselected group as that of the Children's Bureau whose standards represent all types of children. It seems more reasonable to compare normal and superior children with standards obtained from similar groups which include no defective or pathologic cases than to compare them with standards based on unselected groups. It must be remembered when using Merrill-Palmer standards that they are intended for use with healthy children and represent an optimum rather than an average of the total population. For use with underprivileged children tables based on unselected groups would be more satisfactory.

The usual tables of standards do not give any information about the amount of variation from the average figure in each age group which may be considered normal. A much better way of comparing a child's standing height with that of other children of his age is to be able to state how many children of his age exceed him and how many he exceeds. At Merrill-Palmer School the children, all of whom are normal or superior both mentally and physically, are measured monthly on or within two days of their birthday dates during the school year from September to June. Insofar as is possible the conditions of weighing and measuring are kept absolutely constant, and among such a group of superior children it has been found, two-year-old boys vary from 31.5 inches to 37.2 inches in height, the average being 34.6 inches. Formerly the child measuring 31.5 inches would be regarded as retarded as judged by an average height of 34.6 inches and the child of 37.2 inches would be regarded as very large for his age. Both may be, and probably are, normal for their own rate of growth. A two-year-old boy who measures 33.6 inches is shorter than 80 per cent of boys of his own age and taller than 20 per cent. If all the boys in that age group stood up in a row, the smallest being numbered 1 and the tallest numbered 100, this child would be the twentieth from number 1 and eightieth from number 100. Such a ranking is called a percentile. He is said to rank at the 20 percentile of two-year-old boys in height. It is much more helpful to know that such a child is at the 20 percentile of his age group (or that 80 per cent of the children of his own age exceed him in height) than that he is 1 inch below the average height. Such a consideration of the place of the individual child as related to other children of his age after a number of years of experimentation has led to the use of the percentile method of rating children at Merrill-Palmer School in both physical and mental traits.

A percentile value from 25 to 75 inclusive is considered average; a rank from 1 to 24, below average; and a rank from 76 to 99 above the average of the group. Therefore, the boy with a percentile of 88 in height and of 20 in weight

is taller than the average boy of his age and is lighter in weight than the average boy of his height.

The average child should fall between the twenty-fifth and seventy-fifth percentile in height and weight. The fiftieth percentile is the standard.

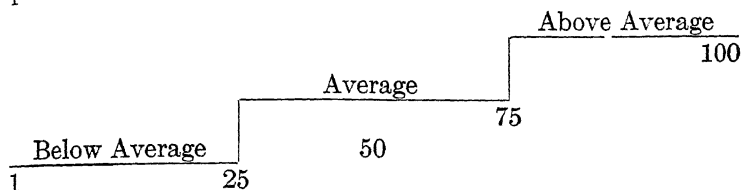


Table VI indicates the range of height found among children at different age levels. Boys of two years may have a range of 6 inches in height, at three years of age 5.4, at four years 6.1 inches, at five years 5.5 inches. This indicates that the 31.5-inch child at two years is just as normal for him as 37.2 inches is for another boy. Constitutional types, physical conditions, the effectiveness with which the body uses the food consumed, the incidence of contagious diseases all may be some of the factors which have affected the rate of growth.

The range of height for girls is given in Table VII. The range in height is similar to those of boys.

The Comparison of Weight on an Age Basis Has Been Discontinued by Many Investigators.—A difference of six inches in height as has been indicated for the same age level would signify that a weight which would be satisfactory for a child of 34 inches would be undesirable for a child of 37 inches and also for a child of 31 inches. Most of the laboratories compiling data on anthropometric measurements consider weight in relation to height. Two children of 34 inches height are compared, sex being kept constant. It has been illuminating to find in the data compiled at the Merrill-Palmer School that boys of 34 inches height may vary from 23 to 33 pounds in weight or a range of 10 pounds, and girls of the same height may weigh from 22 to 31.6 pounds or a range of 9.6 pounds. The range of weight for boys of 38 inches is from 28 to 39 pounds or a range of 11 pounds and for boys of 42 inches from 33.2 to 45.4 pounds or 12.2 pounds, for 44 inches the

TABLE VI
PERCENTILE TABLE ILLUSTRATING RANGE OF GROWTH
Standing Height in Inches of Boys at Merrill-Palmer School
Percentile Rank

Age in months.	1	10	20	30	40	50 (me- di- an)	60	70	80	90	99
24	31.5	33.0	33.6	34.2	34.4	34.6	34.9	35.1	35.4	35.9	37.2
30	33.5	34.6	35.2	35.6	35.9	36.2	36.5	36.8	37.2	37.8	39.2
36	35.0	36.1	36.6	37.0	37.3	37.6	38.0	38.3	38.6	39.0	40.4
42	36.3	37.5	38.0	38.3	38.6	38.9	39.3	39.6	40.0	40.4	41.7
48	37.7	38.9	39.4	39.7	40.0	40.4	40.7	41.1	41.5	42.0	43.8
54	39.2	40.1	40.6	41.1	41.4	41.8	42.1	42.4	42.8	43.4	44.9
60	40.7	41.6	42.0	42.3	42.6	42.9	43.2	43.5	43.8	44.3	45.5

TABLE VII
PERCENTILE TABLE ILLUSTRATING RANGE OF GROWTH
Standing Height in Inches of Girls at Merrill-Palmer School
Percentile Rank

Age in months.	1	10	20	30	40	50 (me- di- an)	60	70	80	90	99
24	31.3	32.3	33.1	33.6	33.9	34.2	34.4	34.7	35.1	35.7	36.8
30	32.9	34.1	35.0	35.1	35.4	35.7	35.9	36.2	36.6	37.1	38.3
36	33.8	35.3	36.0	36.4	36.8	37.1	37.4	37.7	38.1	38.8	40.3
42	34.8	36.5	37.4	38.0	38.4	38.8	39.1	39.5	39.9	40.5	42.2
48	35.8	37.7	38.7	39.3	39.8	40.2	40.6	41.0	41.5	42.1	43.6
54	37.2	39.0	39.9	40.5	41.0	41.4	41.8	42.3	42.8	43.4	44.7
60	39.0	40.4	41.2	41.8	42.1	42.5	42.9	43.3	43.8	44.5	45.7

range is 36.6 to 50 pounds or a range of 13.4 pounds. For girls of the same heights the ranges are comparable except at 44 inches where the range for the girls is only 11.5 pounds.

Tables VIII and IX give the various weights at the different percentile ranks.

TABLE VIII

PERCENTILE TABLE ILLUSTRATING RANGE IN WEIGHT (IN POUNDS) FOR HEIGHT (IN INCHES) OF BOYS AT MERRILL-PALMER SCHOOL

Percentile Rank

Height in inches.	1	10	20	30	40	50	60	70	80	90	99
34	23.0	25.4	26.5	27.0	27.5	28.0	28.5	29.2	30.1	31.1	33.0
35	25.0	27.0	27.9	28.5	29.0	29.5	30.0	30.7	31.6	32.7	34.9
36	26.0	28.0	28.9	29.5	30.1	30.7	31.3	32.0	32.8	34.0	36.2
37	26.9	29.0	29.9	30.6	31.2	31.9	32.6	33.3	34.1	35.3	37.5
38	28.0	30.5	31.4	32.1	32.8	33.4	34.0	34.6	35.4	36.5	39.0
39	29.1	32.0	33.0	33.7	34.4	35.0	35.5	36.0	36.6	37.7	40.6
40	30.6	33.3	34.4	35.1	35.8	36.3	36.9	37.4	38.0	39.0	41.9
41	32.1	34.6	35.8	36.5	37.1	37.7	38.3	38.9	39.4	40.4	43.3
42	33.2	35.9	37.1	37.8	38.4	39.1	39.7	40.3	41.0	42.2	45.4
43	34.3	37.1	38.4	39.2	39.8	40.4	41.1	41.8	42.6	44.0	47.6
44	36.6	38.9	39.9	40.8	41.5	42.2	43.0	43.9	45.0	46.5	50.0

Table XXIII shows the average height for age of Merrill-Palmer Nursery School children, both boys and girls, age twenty-four to thirty-six months. Table XXIV shows the average weight for height of the same group of children. For purposes of comparison the standards of the Federal Children's Bureau, Tables XXV and XXVI, from eighteen to thirty-six months, have been included in the Appendix. Merrill-Palmer boys and girls average about an inch taller in height than the Children's Bureau averages for children of the

TABLE IX

PERCENTILE TABLE ILLUSTRATING RANGE IN WEIGHT (IN POUNDS) FOR
HEIGHT (IN INCHES) FOR GIRLS AT MERRILL-PALMER SCHOOL

Percentile Rank

Height in inches.	1	10	20	30	40	50	60	70	80	90	99
34	22.0	25.1	26.2	26.8	27.2	27.6	28.1	28.6	29.1	30.0	31.6
35	23.3	26.0	27.1	27.8	28.5	29.0	29.5	30.0	30.7	31.7	33.8
36	24.4	27.1	28.2	28.8	29.4	29.9	30.4	31.0	31.8	32.9	35.3
37	25.4	28.2	29.2	29.8	30.3	30.8	31.3	32.0	32.9	34.1	36.8
38	27.0	29.6	30.8	31.4	32.0	32.5	33.0	33.8	34.7	36.1	38.6
39	28.6	31.1	32.3	33.1	33.6	34.2	34.8	35.5	36.5	38.1	40.5
40	29.9	32.4	33.6	34.5	35.1	35.7	36.3	37.0	38.0	39.6	42.1
41	31.2	33.8	35.0	35.9	36.6	37.2	37.8	38.6	39.6	41.1	43.7
42	33.1	35.5	36.6	37.5	38.2	38.8	39.5	40.2	41.2	42.6	45.1
43	34.9	37.2	38.3	39.1	39.8	40.4	41.2	41.8	42.8	44.2	46.6
44	37.0	39.2	40.4	41.2	42.0	42.7	43.4	44.2	45.1	46.2	48.5

same age. A difference of 1 pound is found in the weight of Merrill-Palmer and Children's Bureau children who are the same height. Such a finding gives very clear evidence that when we consider the "median child" of both groups Merrill-Palmer children are heavier and taller.

Rate of Growth.—The rate of growth in height—that is, the monthly increases for a child from twenty-four to thirty-six months of age according to Merrill-Palmer standards averages $\frac{1}{4}$ inch every month. In comparing the rate of growth of a single individual child with the Merrill-Palmer standards, however, we find that the increases are not as regular as the average rate would indicate.

While the average gains of Merrill-Palmer Nursery School children are $\frac{1}{4}$ inch monthly during the period of twenty-four

to thirty-six months, the gains of E. M. during the period of twenty-five to thirty-six months averaged $5\frac{5}{16}$ inches—twice as much as the expected gain. From December to January E. M. seemingly did not gain in height, which period was followed by a gain of $1\frac{3}{16}$ inch from January to February. The weight of this child as compared to other girls of her height indicates that she is from one to two pounds heavier than other girls of her height. Moreover, the weight gains fluctuated from a loss of $1\frac{1}{4}$ pounds in December to a gain of 2 pounds in January and a loss of $1\frac{1}{4}$ pounds again in February. Since the average gain of this child in height was twice as much as that of other girls of her age, it is not surprising that her gain in weight is greater than that of girls of her height.

Such an analysis of the growth of an individual child clearly points out the fallacy of considering small gains or losses over as brief a period of time as one month. Variations in technic, as well as in the physical condition of the child and also his attitudes and cooperation have already been mentioned as possible causes of the fluctuations in height measurements. Since the causes of such fluctuations are unexplainable it has seemed of greater value to consider changes in weight and height over a longer period of time than one month, for example, three or four months. In some cases it has been of interest to compare the actual growth of the children over the total period during school from September to June. It should be made clear that absolute gains over a long period of time as well as the rate of gain during such a period are both factors of importance in considering the growth of the child.

Changes in the Ratio Between Total Length and Trunk Length.—Table X shows the average stem length-recumbent length ratio of preschool children at Merrill-Palmer School from the ages of twenty-four to thirty-six months. The range in each month age level is also given. From a study of these data at Merrill-Palmer School it was found important to stress the variation within each age group as well as the central trend. It is apparent that the ratio of the stem to the total height progressively diminishes with increasing age. It can be seen from the table, for example, that the range of

variability for boys at the twenty-four-month age level is from 63.5 to 58.6, or 4.9 points, but that the range of 50 percentiles from twenty-four to thirty-six months is only 61.2 to 59.3 or 1.9 points. This shows that there may be within an age group a greater difference in ratio than the average difference between two age groups.

TABLE X
STEM LENGTH-RECUMBENT LENGTH RATIO OF MERRILL-PALMER BOYS
AND GIRLS

Age (mos.)	No. of cases.	Average ratio boys.	Range of ratio.	No. of cases.	Average ratio girls.	Range of ratio.
*24	27	61.2	63.5-58.6			
25	..	61.0	63.3-58.5			
*26	35	60.8	63.1-58.4	29	60.8	63.0-58.3
27	..	60.7	63.0-58.3	..	60.6	62.7-58.0
28	..	60.5	62.9-58.2	..	60.4	62.4-57.8
29	..	60.4	62.8-58.1	..	60.3	62.2-57.6
30	..	60.2	62.7-58.0	..	60.1	61.9-57.4
31	..	60.1	62.6-57.9	..	60.0	61.7-57.2
*32	52	60.0	62.5-57.9	46	59.8	61.4-57.0
33	..	59.8	62.2-57.8	..	59.6	61.3-56.9
34	..	59.6	62.0-57.6	..	59.5	61.1-56.8
35	..	59.5	61.8-57.5	..	59.3	60.0-56.6
36	..	59.3	61.6-57.3	..	59.2	60.8-56.5

* The number of cases is reported only at these months because the standards were calculated for six-month age groups in which 24, 26, and 32 were the midpoints; the values at the remaining month levels were interpolated between these values.

It seems fair to conclude that it is possible to use this ratio as early as the preschool age as an index of body type, since it is evident from the table that the short, stocky type of preschool child (child with high ratio) differs conspicuously from the long, lanky type (child with low ratio). A study of 50 preschool children over a period of years indicates that the body type does not change during the preschool years.

Teeth.—"The teeth and jaws are considered together. They are mutually dependent structures and as has been said before

a part of the bony skeleton. In general it can be accepted that their development obeys the same general laws which govern that of the skeleton. The structures and conditions of the teeth are delicate and reliable indicators of an adequate provision of many of the materials necessary for normal growth and the maintenance of good health of the whole body."

Good teeth, says McCollum,⁸³ are determined in great measure, before the child is born. It is true, also, that serious damage may and often does occur to the teeth in postnatal life. As is indicated by Table IV, page 119, calcification of the permanent medial incisors and lateral incisors begins during the first year. Calcification of the canines begins during the third year, of the first premolars during the fourth year, of the second premolars and second molars during the fifth year. Therefore, it is important that the child should receive a diet rich in calcium and phosphorus salts in the proper proportion and vitamins during the period when the teeth are becoming calcified. Thoma¹⁵³ states that "nature, ever economical, utilizes the mineral salts of the roots of the first teeth, which become absorbed as the permanent ones get ready to take their places." Although the first permanent molar begins to calcify before birth, the most important time for the formation of the enamel of the permanent set of teeth as a whole, according to Thoma, is between the ages of two and ten. It is important, therefore, that the preschool child should receive during this period of tooth formation a large amount of the foods necessary for the formation of sound tooth tissues, food rich in mineral salts and vitamins. Moreover, children from the age of nine months on should be gradually given harder foods which have a beneficial effect upon the growth of the jaws and the nourishment of the teeth due to chewing.

Decay in the Deciduous Teeth.—That decay may appear at an early age in the deciduous teeth is evident from the survey of Rypins (quoted by McCollum⁸³), "Rypins examined 1197 preschool children of Kansas City, Missouri, between the ages of three and six years. Rypins found that 27.2 per cent had dental caries, which averaged over one decayed tooth for each mouth examined, and almost four decayed teeth for each

of the carious mouths. Of the teeth erupted 6.3 per cent were carious."

A comprehensive report of scientific studies in the relation of nutrition to the health and *theories regarding decay of teeth* can be found in White House Conference Report, Growth and Development of the Child, Part II, Anatomy and Physiology, pages 160-173. For our purpose it is satisfactory to quote the summary of this chapter.

"The teeth and jaws are an integral part of the bony skeleton of the body. The temporary teeth begin to form in the seventh week of fetal life, the crowns calcifying at about the seventeenth fetal week. By this time the permanent teeth have begun to form, and they begin to calcify about a month before birth.

"Heredity plays a part, though an uncertain one, in the development of the teeth. Familial resemblances in the shape of the teeth, jaws, and face are presumably due to heredity, but the quality of the structure and the development depend largely on nutrition.

"The discovery of the vitamins and the more recent concept of the teeth as living structures have changed the whole outlook in the fields of nutrition, dentistry, and disease. Investigators agree in general concerning the rôle of the separate vitamins. Vitamin A seems to be associated with calcification by its influence on the regulatory mechanism which determines the growth and distribution of bone. Vitamin B complex has only an indirect effect on the teeth by affecting the general nutrition of the whole organism. Vitamin C has a profound influence on the tooth pulp and formation of dentine. Vitamin D exerts a calcifying influence on the tooth pulp and the formation of enamel.

"The different angles of approach in studying the factors influencing teeth are perhaps the cause of apparent confusion in the evidence presented by various investigators. The profound influence which the vitamins are known to have on the assimilation and utilization of available material is not yet completely worked out. The basis of the peculiarities of various species of experimental animals is only beginning to be appreciated as comparisons are made. Until these considera-

tions are fully understood, the nutritional factors involved in the formation of sound teeth cannot be completely evaluated. It can be said without qualification, however, that nutrition is the most vital of all the influences deserving consideration."

Sound Deciduous Teeth.—According to McCollum,⁸³ "diseased teeth appear to result from the eating of foods which do not demand chewing and consequent exercise for the teeth; adherence of pasty foods to the surface of the tooth, with resulting fermentative decomposition with acid formation which etches the enamel; unhygienic condition of the mouth; probably also abnormal composition of the saliva which should protect the teeth, but under certain conditions may fail to do so."

"The development of sound teeth, capable of resisting the destructive agencies mentioned, is essentially a dietary problem. The small jaws and crowding of the teeth so frequently seen in children of today is almost certainly the result of faulty skeletal development, and will be influenced by the dietary errors which favor the development of rickets. Malposition favors food packs and the maintenance of foci of fermentation between the teeth. The evidence presented strongly indicates that failure of normal tooth formation—by which we mean the proper spacing of sound teeth—during the developmental period, is the basic cause of a series of events which terminates in dental decay."

Such conclusions all have a very direct and definite bearing upon the development of optimum teeth in the preschool child. Not only proper growth but proper dentition all point to encouraging the preschool child to become familiar with and eat foods which in the light of experimental evidence today favor the development of perfect teeth.

MOTOR COORDINATION

General Bodily Activity.—From eighteen months on the general bodily activity is greatly increased. Walking has usually become more or less automatic, although it retains something of a "toddle" until the child is nearly three years old. Other skills develop rapidly now; he runs, climbs stairs, boxes, trees; he swings; he jumps up and down, often climb-

ing up and jumping down from boxes or stairs, or simply jumping up and down in one spot for minutes on end. He does not often fall now, although his venturesomeness may occasionally take him into places from which he cannot get down. He digs, fills pails, and carts sand in a wagon. He rides his kiddie car, his scooter, his tricycle for fairly long periods without stopping.

Differences in Character of Children's Activity.—Stuart¹⁴⁴ says: "In the preschool and early school years exercises should be of the sort to use all the large muscles and increase the activity of circulation and respiration. Most of the informal out-of-door childhood games, such as tagging, throwing ball, and the like, accomplish these ends.

"It must be clearly recognized that children differ tremendously in their possibilities for muscle development and physical strength and that different sports are suited to different types of build. The thin small-muscle type of child cannot at will be converted into the stocky large-muscle type. Training must continually avoid the attempt to make a child something which he was never intended to be. Children also differ in their endurance irrespective of their physical type. The lanky, small-muscle boy may be less powerful than his bigger brother and yet have greater endurance. He has an advantage when it comes to speed while the large-muscle boy has an advantage in strength, so that neither should be considered deficient. In addition to considering the size and strength of muscles, one must plan for a child's physical education after considering his mental ability, his nerve control, the physiology of his circulation, respiration, and nutrition, and his general physical health."

Children differ, however, in their activity. Sholly¹⁴⁷ found in her study of the activity of preschool children that the differences to be observed in children's activity are great—both in the choice of activity and in the amount of energy expended on it. Some children will spend most of their time on construction activities, others practically none. Some will use the vehicular toys most of the time, others are inclined to the imaginative types of play. Some children will never be found using jungle gym and similar pieces of apparatus.

Some children apparently will be quiet and comparatively inactive while others seem to be very active during comparatively longer periods of time. However, close observation with an Activity Rating Scale over a stretch of time clearly revealed the fact that the inactive child has occasional spurts of energetic activity and that the active child is extremely energetic only in spurts and also has long spells of quiet playing or working.

An example of such observations illustrates this point. E. M. was found to be one of the most active children observed by Sholley. On one occasion, E. M., two years, eight months of age, ran up an inclined plank, jumped into the sand pile on reaching the end, turned a somersault, got up, and started again, repeating the activity for five minutes. This was the longest period of strenuous activity observed in the ninety-six hours of observation on this child. The children as a group spent unbroken periods of from five to fifteen minutes with inactive occupations. Children of this age spend more time in activities which represent lower levels of activity than in activities which represent the higher levels of energy expenditure. There is, however, frequent shifting in intensity of activity.

Skill with Hands.—Skill with the hands develops rapidly from eighteen months to three years of age. At two years the child can scribble, cut gashes in paper with scissors, can string fairly small beads with a needle and thread; and can pile four or five blocks into a tower. At three years he can copy a circle with a pencil; can close his fist and wiggle his thumb (so great has his control of the thumb become); can build a high tower with his blocks; can build simple block houses; can set a low table neatly, if told what to put on it; can carry a tray containing a plate or bowl, feed himself neatly with a fork; can wipe up spilled things without aid, dust, help care for a pet animal, wipe a number of dishes; can wash himself efficiently, turning the water into the bowl, soaping backs and fronts of his hands, using a wash cloth for his face, wring it out and hang it up on his own hook. He can manage the front buttons of his clothing at the toilet and can undress himself with the exception of

difficult buttons and fastenings, hanging up his clothing neatly and placing his shoes under his bed or in the closet.

These skills by which he cares for himself depend, of course, on the character of his clothing, the nature of the house in which he lives, and the attitude of surrounding adults as well as upon his intelligence and his general physical development. He cannot unbutton tiny buttons with small or concealed buttonholes. He cannot hang up his own coat or suit unless there are proper loop tapes by which to hang them, and hooks

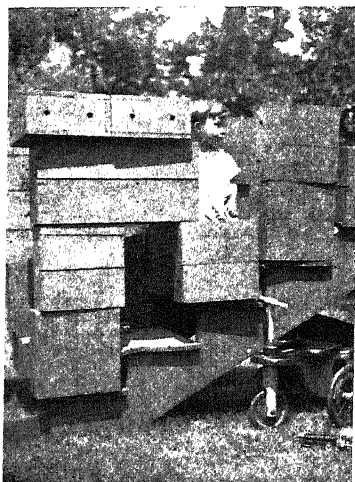


Fig. 21.—This four-year-old boy has built his own garage and is resting while he surveys his project. One can imagine the amount of physical energy he must have used and can guess what his appetite for luncheon will be.

in the closet low enough for him to reach. He cannot care for himself in the bathroom unless he has a box light enough for him to move about, steady enough so that he will not tip over when he stands on it, and high enough so that he can reach the toilet or the faucets of the basin. He will not learn respect for other people's towels and wash cloths until he has his own and a place within reach to hang them. It is true, too, that independence and the skills necessary to it are learned only gradually, and that they are only begun at the age of three.

Care must, of course, be taken not to force these learnings any more than we would "overcoach" language or any other learning. If adequate practice is allowed, however, these skills are usually fairly well developed at five years, the age at which children can be almost entirely independent of adults in matters of personal hygiene excepting for supervision. Independence can be learned, however, only when the adults who care for the child are willing to relinquish their position of complete control over them. There is a great temptation to

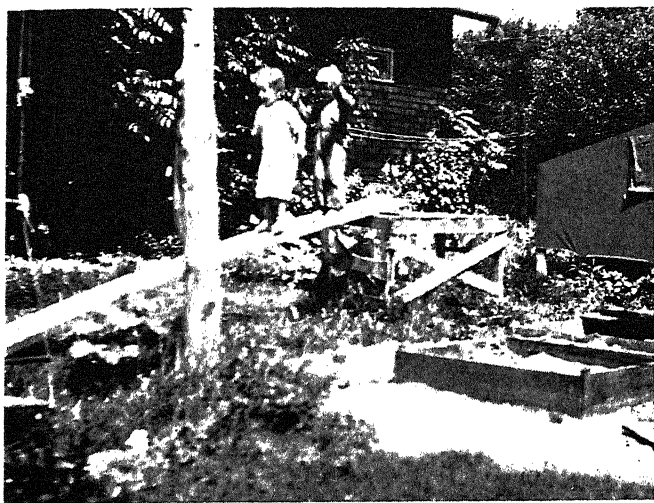


Fig. 22.—Lessons in balance. These two-year-old children have no fear and have learned their courage on this simple backyard equipment.

do everything for him in order to keep him entirely dependent on us as adults and consequently helpless without us. It is a subtle way of fastening him to us. Few parents would do this, even for the emotional gratification it affords them, if they realize how seriously they handicap the motor, mental, and emotional growth of the child by refusing him his independence as he is capable of assuming it step by step.

Play Equipment.—Equipment for children from eighteen months to three years of age should be simple: Plenty of

space, particularly out-of-door space, with a place to run, to climb, to dig; a shovel and pail, or an old pan and spoon from the kitchen; a sand pile or an open patch of dirt, a kiddie car or a tricycle to ride; some simple and durable blocks (fairly large ones at this age), or odd bits of board, empty spools, empty oatmeal cartons, etc.; a doll (a corn stalk dressed up will do), and a carriage (a box on wheels can substitute for this), a few bits of cloth for covers; clay or a bit of mother's dough from the baking; paper and pencil (wrapping paper serves); the list could be extended indefinitely. The main principle to be followed is that the material should not be useless, mechanical toys, but *materials* which challenge him to resourceful activity, which encourage either general bodily activity, or skill with the hands; should provide for development of perceptions and judgments; should teach techniques for expressing oneself. Opportunity to care for one's own physical needs, the privilege of helping about the house or the yard, and other children to play with, plus simple "do-with" equipment should provide even as early as eighteen months a sound background for physical, mental, and social growth.

CLOTHING

Clothing Important to Growth and Learning.—Clothing at this age as at every other age should be chosen to meet the activity and educational needs of the child as well as to protect him against the temperature and weather.

Too warm clothing may increase the child's susceptibility to colds. The child too thinly clad is likely to become inactive. The decision in regard to the suitable amount of clothing must be made on the basis of the child's reaction rather than the adult's feeling. Soft, lightweight garments of a spongy wool material are warmest, but sweaters can be covered with the right sort of outdoor garments to keep them dry in wet and snowy weather, since there should always be a period of outdoor play, except in very stormy weather. Rubbers should be worn when the ground is wet.

Clothing Should Fit.—Clothing should also be chosen of adequate size. All clothing should be large enough to be easily put on and should not bind the child in any way, but it should

not be so large as to be cumbersome and so hamper his activity. Shoes, stockings, bedroom slippers, rubbers, and over-shoes should all be long enough. If too short they may affect the shape of the foot and the way the child walks, and so cause troubles of various sorts. Drawers and trousers should be long enough in the seat not to bind in any way, lest they cause an irritation which might encourage undesirable habits. Garters, if round, which are preferable in general, must be loose enough not to make a mark on the leg, although tight enough to hold stockings up. If long garters are used, they should be made of elastic that has plenty of "give" to it. They must not be tight and must be fastened to waists that are so made that they will bring the pull well up on the neck, and not on the tips of the shoulders which pulls the shoulders forward or down and has a bad effect on the posture.

Clothing Should Allow Freedom.—Clothing should be chosen to give the child freedom in play. Garments should be simply but attractively made, and should be of durable material which can be easily cleaned or washed. Elaborate clothes about which the child has been cautioned and of which he is supremely conscious may prevent the free expression of his desire and need for activity. Unattractive clothes, or any clothing that makes a child conspicuous, may also have an undesirable effect. Short coats and sweaters, light in weight, with leggings or bloomers, give the child freedom for play as well as covering him adequately. Bulky garments, heavy in weight, such as heavy overcoats, hamper a child's activity; they are often of greater weight than a child should be expected to carry. "All wool" garments are light in weight as well as warm.

Weight of Children's Clothing.—According to Griffith⁵² the clothing of a one-year-old child averages in weight $1\frac{3}{4}$ pounds; from one to four years, 2 pounds; and from four to six years, about $2\frac{1}{2}$ pounds. The ratio of the weight of the clothing to weight of the child is 6 per cent from two years to five or six years.

The results of a study made by Schmidt-Monard in Germany on the weights of children's clothing are quoted by Griffith. Schmidt-Monard found that children's clothes

from three to six years average 7 per cent of the total weight for boys, and 6 per cent for girls.

Range of Weights of Clothing Worn by Children.—A study of the clothing of 50 nursery school children made by one of the students at Merrill-Palmer School (Campbell) has shown that the ratio of the weight of clothing to body weight was for boys' indoor clothing 4.47 per cent, and outdoor clothing 11.87 per cent of body weight. For girls the indoor clothing weighed 3.91 per cent of the body weight, and the outdoor clothing 9.75 per cent.

Campbell found also the range of indoor clothing weights to be 15 ounces to 2 pounds and 12 ounces, and the range of outdoor clothing weights to be 1 pound 12 ounces to 6 pounds during November, December, and January. The average number of pieces of clothing worn indoors by both boys and girls was six, and outdoors by both boys and girls was ten.

In considering fabrics, it was found that the majority of the girls wore all cotton garments indoors, while the boys wore a greater variety of fabrics. The average weight of the clothing worn outdoors by boys is very slightly heavier than that worn by girls, while the weight of the boys' indoor clothing was 27 per cent heavier.

Clothing Should Be Chosen to Allow for Learning.—The child's clothes should be so made that he can learn at an early age to wait on himself. A child likes to learn, and he can begin to learn at an early age. Large buttons and buttonholes, few in number and easy to reach, facilitate the learning process. Many and small buttons and blind buttons and blind buttonholes hinder it. Dresses, blouses, and waists should button in front, so that the child may learn to button and unbutton them. Plackets in drawers and trousers should be long enough to allow the seat to drop completely, so that the child may easily seat himself on the toilet without help. Cuffs on sleeves should be large enough so that the sleeves may be easily rolled up when hands are to be washed. It is often difficult to find in manufactured clothing garments that are planned to accomplish the above purposes.

FOOD

Studies Which Have Been Made.—The work of *Holt* and *Fales*⁶⁴ is the first extensive study of the food requirements of children who were found to be normal by medical examination. After studying the work of previous investigators, they formulated a schedule of food allowances for children from one to eighteen years of age, based on basal metabolism plus allowances for growth, activity, and excreta. They checked the validity of these allowances by observations of the actual food intake of 106 healthy children ranging from one to eighteen years of age, over a four-day period, and found that the data concerning the actual food intake agreed closely with their estimates.

A study similar to that of *Holt* and *Fales* was made in 1924 by *Goodhue*,⁵⁰ who confined her observations to preschool children, all of whom were in good health and of average or better than average development, as determined by medical examination. *Goodhue* weighed the actual food intake of each child over a twenty-four hour period, checking this with a detailed report of the food intake measured by the mother for the following seven days, to be sure that it represented the diet. She determined the calcium, phosphorus, and iron as well as the calorie, protein, fat, and carbohydrate intake.

A third study of this nature was made in 1926 by *McKay*,⁸⁴ who obtained the actual weighed food intake of 55 children between two and six years of age over a four-day period. Twenty-five of the children were in private homes and 30 in an orphanage. All were examined by a pediatrician and pronounced normal physically. The average intake of the children in private homes was found to be higher in calories, protein, calcium, phosphorus, and iron than that of the orphanage children in corresponding age groups.

An unpublished study of the food intake of 124 children at the *Merrill-Palmer School* in Detroit gives further data on food standards. These children were from private homes representing a wide range of economic status. The school program includes the cooperation of the parents in submitting, at least three times a year, a report of the amounts of food, by measure, eaten by their children over a period of

seven consecutive days. From several hundred such reports 124 were selected as being accurate, complete, and representative of the diets of normal, healthy children as determined by physical examination and the growth records kept by the school. The food intakes were calculated from these reports and the school records, and the average intake for each of the different age groups was determined.

Summary of Studies.—These studies of normal children made by the individual method probably give the best conception of the food requirements of the preschool child. The actual number of children studied by this method is still relatively small and it is possible that with further studies the standards thus obtained will have to be modified. The general agreement in the standards determined by these methods, however, seems remarkable, when the number of persons making the investigations, the variations in the technic followed, and the unavoidable errors occasioned by the varying content of the same prepared dish, are considered. The results of these studies are shown in Table XI.

Rose Study.—During the four years from fall of 1926 to the spring of 1930 dietary records of the Nursery School of the Institute of Child Development of Teachers College (New York City) were made by Rose, Robb, and Borgeson.* "The children receive approximately half of their total calories at the school, and the diet has been carefully controlled to conform to the best known practices in feeding young children. Conferences with the parents have resulted generally in excellent cooperation at home, and suggestions made regarding the food to be given at home have been well received and quite regularly adopted. The returns from the study of 58 children from two to three years of age, and of 92 children from three to four years of age show that the food of the children conforms to our best knowledge of the requirements at these ages, and therefore the distribution of calories in their diets may be regarded as a useful guide in the selection of food for children of these ages, inasmuch as the records of health and growth show that they have made excellent prog-

* White House Conference Report, "Growth and Development of the Child," Part III, Nutrition, pp. 442, 443.

TABLE XI
 FOOD INTAKE OF PRESCHOOL CHILDREN IN TERMS OF ORGANIC NUTRIENTS AND FUEL VALUE*
Average Daily Consumption per Child

Investigator.	Children studied.						Total protein consumed by children of—						Total fat consumed by children of—						Total carbohydrates consumed by children of—						Total fuel value consumed by children of—					
	2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.	
	No.	Cal.	No.	Cal.	No.	Cal.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Cal.
Merrill-Palmer.....	30	47	47	.....	.....	.....	50	52	53	.....	.....	.....	54	62	59	.....	.....	.....	178	185	186	.....	.....	.....	1300	1506	1487	.....	.....	.....
Holt and Fales ¹	11	10	12	10	10	.....	53	58	56	60	.....	.....	40	52	57	61	.....	.....	165	168	173	215	.....	.....	1313	1332	1429	1649	.....	.....
McKay ²	12	6	7	.....	8	.....	42	50	57	.....	.....	.....	49	59	71	.....	.....	.....	149	176	212	.....	.....	.....	1200	1429	1721	.....	.....	.....
Goodhue.....	2	3	6	.....	.....	.....	44	54	52	68	.....	.....	47	46	60	97	.....	.....	161	188	217	241	.....	.....	1246	1380	1617	2108	.....	.....

<i>Average Daily Consumption per Kilogram of Body Weight³</i>																													
Children studied.						Protein per kilogram, children of—						Fat per kilogram, children of—						Carbohydrate per kilogram, children of—						Fuel value per kilogram, children of—					
2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.		2-3 yrs.		3-4 yrs.		4-5 yrs.	
No.	Cal.	No.	Cal.	No.	Cal.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Gm.	Cal.
Merrill-Palmer.....	30	47	47	.....	.....	3.6	3.3	3.1	.....	.....	.....	4.0	4.0	3.3	.....	.....	.....	13.0	11.8	10.8	.....	.....	.....	102	96	93	87	.....	.....
Holt and Fales ¹	11	10	12	10	10	3.9	4.0	3.2	3.3	.....	.....	3.6	3.6	3.2	3.3	.....	.....	12.1	11.2	9.8	11.5	.....	.....	96	93	82	89	.....	.....
McKay ²	12	6	7	.....	8	3.1	3.0	2.9	.....	.....	.....	3.0	3.0	3.7	4.2	.....	.....	11.0	10.6	10.9	.....	.....	.....	90	87	89	82	.....	.....
Goodhue.....	2	3	6	.....	.....	3.3	3.0	2.7	2.9	.....	.....	3.5	2.5	3.0	4.2	.....	.....	11.4	10.5	11.1	10.5	.....	.....	90	77	82	91	.....	.....

¹ The physiological fuel values reported here represent calculations from protein, fat, and carbohydrate actually consumed, rather than the author's theoretical values.

² Only children from private homes are included.

* Circular No. 203, U. S. Dept. of Agriculture, p. 5, "Midday Meals for Preschool Children Used in Day Nurseries and Nursery Schools," Sweeney and Chaffield.

ress. As a guide, then, to the selection of an adequate diet for children of different ages, Table XII has been prepared:"

TABLE XII
PRESCHOOL AND KINDERGARTEN CHILDREN—COST UNRESTRICTED

Age.	Percentage of total calories from each class of food.					
	Milk.	Foods from cereal grains.	Vegetables and fruits.	Egg yolk.*	Fats.†	Sugar.
1-2 years	60-70	10-20	10-15	2-3	1-3	0-1
2-3 years	50-60	16-20	15-20	3-5	3-5	1-3
3-4 years	45-55	18-22	16-22	4-6	5-7	2-4
4-5 years	40-50	20-24	16-22	4-7	6-8	3-5

* Chiefly egg and liver.

† Chiefly butter and cod liver oil.

COST RESTRICTED

Percentage of total calories from each class of food.

Age.	Milk.	Foods from cereal grains.	Vegetables and fruits.	Egg yolk.*	Fats.†	Sugar.
	*					
1-2 years	65-75	10-20	5-10	1-2	1-3	0-1
2-3 years	55-60	20-22	10-12	2-3	3-4	1-3
3-4 years	50-55	20-24	12-14	4-5	4-5	2-3
4-5 years	45-50	23-25	14-18	5-6	5-8	2-5

* Chiefly egg yolk and liver.

† Chiefly butter and cod liver oil.

The following day's menu is given in the White House Conference Report on "Growth and Development of the Child," Part III, page 450, to illustrate the use of this method in guiding the making of a menu.

Breakfast:

Orange juice, 4 tbsp.
 Oatmeal, $\frac{3}{8}$ cup
 Milk (for oatmeal and to drink), 1 cup
 Toast (1 slice whole wheat bread)
 Butter for toast, $\frac{1}{2}$ tsp.
 Cod liver oil after breakfast with 2 tbsp. orange juice and $\frac{1}{4}$ tsp. corn syrup

Dinner:

Baked potato, 1 medium
 Chopped, cooked carrots, 6 tbsp.
 Toast (1 slice whole wheat bread)
 Butter, $\frac{1}{2}$ tsp.
 Custard { Milk, $\frac{1}{2}$ cup
 Sugar, $\frac{1}{2}$ tsp.
 Egg, 1
 Milk to drink, $\frac{3}{4}$ cup

Afternoon lunch:

Milk, $\frac{1}{2}$ cup
 Graham crackers, 2

Supper:

Cream of pea soup { Milk, $\frac{1}{2}$ cup
 Pea pulp, 4 tbsp.
 Bread, white, 2 slices
 Butter, $\frac{1}{2}$ tsp.
 Milk to drink, $\frac{1}{2}$ cup
 Applesauce, $\frac{1}{4}$ cup { Apple pulp, 4 tbsp.
 Sugar, $\frac{1}{2}$ tsp.

This example serves to illustrate how actual diets may be constructed on the basis of rules presented in the form of percentage of total calories. The rules may also be used in the reverse direction to test any given diet for its adequacy. The diet may then be modified if any class of foods is found to be excessive or deficient. No attempt is made here to set up final standards, as all of the rules here set forth are subject to revision in the light of advancing knowledge, but they may serve usefully as tentative practical guides. They provide a method for measuring everyday foods in terms of the requirements and principles of nutrition which seem adequately established at the present time.

Mineral Needs of Children.—Less work has been done on the mineral needs of young children. Both McKay and Goodhue determined the amount of calcium, phosphorus, and

iron in the diets of children they studied. In Table XIII* these data are presented for the individual age groups in terms of total daily consumption, and also of consumption

TABLE XIII
DAILY MINERAL INTAKE OF PRESCHOOL CHILDREN ACCORDING TO MCKAY*
AND GOODHUE

Author.	Age group.	Children in group.	Average age.	Calcium.		Phosphorus.		Iron.	
				Total	Per kilogram.	Total	Per kilogram.	Total	Per kilogram.
	Yrs.	No.	Mos.	Gm.	Gm.	Gm.	Gm.	Mg.	Mg.
McKay.....	2-3	12	31	0.937	0.069	0.973	0.072	6.9	0.51
Goodhue.....	2-3	2	27	0.803	0.061	0.931	0.069	7.5	0.55
McKay.....	3-4	6	40	1.013	0.061	1.091	0.066	8.8	0.54
Goodhue.....	3-4	3	39	1.113	0.064	1.184	0.068	9.0	0.51
McKay.....	4-5	7	53	1.188	0.061	1.273	0.065	9.8	0.50
Goodhue.....	4-5	6	56	1.144	0.058	1.154	0.059	8.7	0.45
Do.....	5-6	8	66	1.313	0.057	1.403	0.060	10.4	0.44
McKay average†.....			39	.....	0.065	.....	0.069	.....	0.51
Goodhue average†.....			54	.....	0.059	.....	0.062	.....	0.47

* Only children from private homes are included.

† Weighted according to the number of children in each age group. Total number is 25 in the McKay, and 19 in the Goodhue study.

per kilogram of body weight. It is probably significant that consumption per kilogram decreases progressively with increase in age.

Mineral requirements have been investigated by means of metabolism experiments. Recommendations based on studies of this sort usually make a generous allowance over the quantities determined, and are perhaps the safest criteria to use in planning diets of children. Sherman concluded from a study of calcium and phosphorus metabolism in 12 children three to fourteen years of age that it is advisable for the growing child to have at least 1 Gm. each of calcium and phosphorus per day. He makes no definite statement about the iron requirement of children except that it is probably greater relatively than for adults for whom he recommends a total of at least 15 mg. per day, or 0.5 mg. per hundred calories.

Recently, Rose *et al.* studied the iron metabolism of one

* Circular 203, U. S. Dept. of Agriculture, "Midday Meals of Preschool Children," by Sweeney and Chatfield.

girl of two years and seven months, weighing about 14 Kg. They concluded that the child's actual requirements were about 5.7 mg. per day, and they recommended for such a child about 50 per cent more, or 8.5 mg. Expressed in terms of body weight, this would be 0.61 mg. per kilogram.

It may be assumed that younger children require more per kilogram, and older children less, but this recommendation seems a liberal one for children from two to four years of age. It would correspond to a total intake of about 8 mg. at two and 10 mg. at four. Probably an allowance of 12 mg. at six would be exceedingly generous.

Sherman's recommendations for a gram each of calcium and phosphorus per day are generally used in judging adequacy of these elements in the meal. An allowance of 9 mg. of iron per day, or about 0.6 mg. per kilogram of body weight seems satisfactory to measure the adequacy of the diet for the three-year-old child. Sherman believes, however, that owing to the demands of growth the mineral requirements of the child are greater in proportion to his energy needs than those of the adult. Sherman and Hawley agree that the optimum standard for calcium and phosphorus is the amount of each contained in 1 quart of milk plus what is provided by the rest of an adequate diet. Table XIV gives the standard followed in feeding children at Merrill-Palmer School.

In a study made by Rose, Robb and Borgeson¹²¹ on 58 children in the two-year group and 92 children in the three-year group it was found that: "The total calcium intake ranged from 0.78 to 1.5 Gm. per child per day, with median values of 1.13 and 1.17 Gm. per day for two- and three-year-olds respectively.

"The total phosphorus intake ranged from 0.84 to 1.54 Gm. per child per day, with median values of 1.14 and 1.18 Gm. for two- and three-year-olds respectively.

"The total iron intake ranged from 5.5 to 12 mg. per child per day, with median values of 7.5 and 8.5 mg. for the two- and three-year-olds respectively. A study by Rose, Vahlteich, Robb and Bloomfield of the iron balance in a nursery school child aged two and one-half years, indicated that 0.75 mg. of iron per 100 calories of food ingested would be necessary to maintain a positive iron balance. The actual

TABLE XIV
AVERAGE INTAKE PER UNIT OF BODY WEIGHT AND STANDARDS FOR A THREE-YEAR-OLD CHILD, WITH SOURCES
OF THE FOOD CONSTITUENTS IN THE MEALS AT THE MERRILL-PALMER SCHOOL**

Item.	Protein.	Fat.	Carbohydrates.	Fuel value.	Calcium.	Phosphorus.	Iron.	Vitamin A.	Vitamin B.	Vitamin C.
Average daily intake per kilo of body weight*	Gm. 3.5	Gm. 4.6	Gm. 12.4	Ca. 99	Gm.	Gm.	Gm.			
Average daily intake per pound of body weight. . . .	1.6	1.8	5.6	45						
Standard for day†	51	59	184	1463	1.0	1.0	0.009			
One-half standard for day†	26	29	92	734	0.5	0.5	0.0045			
Foods in school meals which supply these constituents‡	Eggs, milk, meat, fish, cheese.	Butter, cod liver oil, meat, eggs, milk.	Rice, bread, other cereal products, potatoes, desserts, and other starchy vegetables.	.....	Milk, fruits, vegetables.	Egg yolk, meat, milk, cereal products.	Green vegetables (especially spinach), egg yolk, meat (especially liver), prunes.	Butter, cod liver oil, egg yolk, milk, green and yellow vegetables.	Vegetables, fruits, eggs, milk, whole wheat bread, other whole cereals.	Tomato juice, orange juice, raw vegetables, fruit.

* Average intake of two- to three- and three- to four-year-old groups in the Merrill-Palmer study, Table I.

† The average daily intake of a three-year-old child weighing 14.8 Kg., calculated from the intake per kilogram, is here considered as standard for purposes of judging adequacy of nursery school meals. Mineral standards are based on work of Sherman and Rose and others.

‡ These quantities are used in judging the adequacy of school meals.

§ Because the Merrill-Palmer School is in a region where iodine is prevalent, the children are given iodine in the form of tartaric acid diiodide in chocolate tablets (iodostarsin tablets), and no special emphasis is placed upon iodine-containing foods.

** Circular 203, U. S. Dept. of Agriculture, "Midday Meals for Preschool Children," p. 11, Sweeney and Chaffield.

median values of our children's dietaries are about 20 and 25 per cent respectively above an intake of 0.5 mg. per 100 calories, due chiefly to the relatively liberal use of fruits and vegetables, and daily use of eggs. A seven-months' study of the hemoglobin values of the blood of these children by Platt and Freeman has shown for the most part good hemoglobin production, the values ranging from 9.8 (one case) to 16.6 Gm. of hemoglobin per 100 cc. blood and averaging 12.6. The average for this age as given by Williamson is 12.9. Since the formation of hemoglobin is easily depressed in young children, and high iron reserves are undoubtedly desirable, it would seem that effort should be made to keep the iron intake of little children high."

What Home Reports Show.—A study of 250 home reports made by parents of children attending the Merrill-Palmer Nursery School showed that their home meals frequently did not contain enough fresh fruits, and cooked and uncooked green leafy vegetables to meet the needs of the growing child. Analyses of the home dietaries also proved them, as a rule, low in calcium, iron, and the vitamins, if current standards are accepted.

Making of Child's Menu.—Knowledge of the nutritive requirements of the child's body is not enough; the practical question is how to choose the foods and combine them into meals which will give adequate material to the body for its needs. Economic and social factors play an important part in the choice of food and differences due to climate, activity, age or individual peculiarities of digestion may influence the amount required by an individual child.

No one food is indispensable, not even milk, provided all the other components of the diet are chosen so as to meet the various dietary requirements. Milk however is one of the foods which must and does assume an important place in the child's diet because of the excellent quality of its protein, the completeness of its assortment of mineral elements, except iron, and to the amounts in which they occur and especially the high content of calcium; the presence of vitamins A and B (B_1 , B_2) in quantities which if milk is generously used will be protective against the deficiency of any of these. For

most children in good health a quart a day seems desirable. This quantity includes that used in cooking and in prepared foods as well as that taken with the meals.

Since feeding a child is a quantitative process measurements of one kind or another are inescapable. Measurements may be expressed in parts of standard measuring cups or in the very simple and crude way of servings.

Menus Showing the Variety of Foods and the Amounts Suitable for a Three-Year-Old.—The following menus for three days are suggestive of the variety of food which can be introduced into the diet of a child of three years and supply an adequate, balanced ration.

Breakfast.	Breakfast.	Breakfast.
1 orange	$\frac{1}{3}$ cup apple sauce	$\frac{1}{4}$ cup stewed apricots
$\frac{1}{4}$ cup rolled oats	6 tablespoons wheatena	$\frac{1}{4}$ cup Pettijohns
4 tablespoons whole milk	1 cup milk	1 cup milk
1 slice toast	1 slice toast	1 slice toast
$\frac{1}{2}$ teaspoon butter	$\frac{1}{4}$ teaspoon butter	$\frac{1}{4}$ teaspoon butter
1 cup milk	1 tablespoon honey	
Dinner.	Dinner.	Dinner.
1 meat ball	$\frac{1}{3}$ cup salmon loaf	$\frac{1}{2}$ cup cream tomato soup
$\frac{1}{3}$ cup creamed cabbage	1 tablespoon cream sauce	$\frac{1}{3}$ cup green beans
$\frac{1}{3}$ cup stewed tomatoes with croutons	$\frac{1}{3}$ cup spinach	1 carrot sandwich
1 celery sandwich	$\frac{3}{4}$ cup milk	$\frac{2}{3}$ cup milk
$\frac{2}{3}$ cup milk	1 medium celery stalk	$\frac{1}{3}$ cup cream tapioca with crushed pineapple
$\frac{1}{3}$ cup stewed prunes	1 cabbage sandwich	
	$\frac{1}{3}$ cup stewed plums	
	1 oatmeal cookie	
Supper.	Supper.	Supper.
$\frac{1}{2}$ cup cream vegetable soup	$\frac{1}{3}$ cup scalloped potatoes	$\frac{1}{3}$ cup scrambled eggs
1 lettuce leaf	$\frac{1}{3}$ cup buttered carrots	1 small baked potato
1 bread and butter sandwich	2 leaves lettuce	$\frac{1}{4}$ cup buttered cabbage
1 cup chocolate blanc mange	1 cup milk	1 medium stalk celery
$\frac{2}{3}$ cup milk	1 cottage cheese sandwich	$\frac{2}{3}$ cup milk
	$\frac{3}{4}$ cup baked custard	$\frac{1}{3}$ cup grapes (seedless)
Midmorning lunch.	Midmorning lunch.	Midafternoon lunch.
$\frac{1}{3}$ cup tomato juice	$\frac{1}{3}$ cup tomato juice	$\frac{2}{3}$ cup milk

In providing the main meal (dinner) for the child the following guide has proved helpful:

- A main dish, usually source of protein and consisting of eggs, meat, liver or fish, combination of milk and eggs
- A cooked vegetable
- An uncooked green leafy vegetable
(may be used in sandwich)
- Milk to drink and used in cooking
- Whole wheat bread
(in a sandwich)
- An additional source of carbohydrate either vegetable, a dessert or cookie
- Fruit or other dessert, usually fruit flavored

Appearance of Child's Food.—"The normal feeding habits of the older child are but a natural outgrowth of this early, simple development. If he is properly handled the normal child should anticipate his meals with pleasure, should be glad to go to the table and will eat an adequate amount and variety of foods until he is satisfied. This will be enough food to maintain the growth and development to which he is destined."*

There are a number of factors to be considered in establishing the right attitude of a child toward his food. The esthetic appeal of the food itself has a marked effect upon appetite. Most persons realize that the sight, taste and smell of the food served makes a direct appeal to the senses. Meals planned to offer some contrast of color, flavor, and texture probably attract children as they do adults. Careful preparation and attractive service are highly desirable. One serving of food that is burned or uncooked or too hot gives an unpleasant sensation that, if repeated, may give rise to a food prejudice which will take months of reeducation to overcome.

Factors Affecting the Child's Attitude Toward Food.—Experience indicates that small portions, with an opportunity for second servings, inspire a much greater desire for food than large portions, and have the further advantage of helping the child to form the habit of finishing what is placed on his plate, since they can usually be eaten without undue effort.

* White House Conference Report, Part III, Nutrition, p. 511.

Irregular meals and eating between meals, which result in a constant, even though small, supply of food in the stomach, prevent the contractions of the stomach which normally give rise to the feeling of hunger.

From the beginning of the child's life, the kind of food he eats influences his appetite. A diet containing the right proportions of the different food elements results in a general body vigor which in itself promotes a good appetite. It is recognized that vitamin B has a favorable effect upon appetite. Experiments upon animals have shown that diets lacking it, though otherwise apparently adequate, produce fitful appetites in a very short time. This relation of vitamin B and appetite is one of the reasons for the emphasis placed upon whole wheat, including the germ, whole grain cereals, cabbage, spinach, and tomatoes, all valuable sources of vitamin B, in the diet of the young child.

The physical condition of the child plays an important rôle. The healthy, active child usually has a noticeable eagerness for food at mealtime, often absent in the child who is physically below par. In a healthy child a sudden lack of appetite may be a sign of an approaching illness. Frequent colds, ear troubles, and other infections all seem to affect the appetite.

The child who is fatigued from over strenuous play, excitement, or lack of sleep is likely to show a distaste for food. Urging him to eat under these conditions is not advisable. Rest and possibly a small amount of food, such as a glass of milk, are best at such a time, even if it is the child's regular mealtime.

This discussion is based solely upon the child with no known food idiosyncrasies. It is recognized, however, that some few children have food sensitizations which even when very slight seem to inhibit the desire for food.

Need of Intelligent Attention to the Child's Feeding.—Stuart¹⁴⁴ says in discussing feeding in early childhood that: "One should continue to give attention to a child's diet during these years, for errors of feeding can still lead to disturbances in nutrition, and habits previously formed can quickly be broken. It is an age during which children are more apt to

be disinterested in food than to wish to overeat, and a time when dislikes and quirks of appetite are apt to lead to an unbalanced diet. Interest in the world and its activities is often keener than interest in food, and the child may resent all efforts to 'make him eat.' There is no period during which intelligent handling is more essential and during which misdirected zeal may do more damage.

"The regulation of diet at this age, therefore, consists in the planning of a feeding schedule which takes account of small appetite and avoids frequent feedings or large amounts. It consists in the choice of simple but attractive foods that have high food value but that will not place an unnecessary burden upon digestion and that will not, because of their high flavor, lead to refusal of other foods. The supper should continue to be light and simple, as this is the time at which a child is most likely to be tired and to digest food with difficulty. Most important of all, diet regulation consists in the offering of food in such a way and in such an atmosphere as to create interest in and independent enjoyment of food rather than resentment and dislike."

Attitude of Adults to Child at Mealtime Is Important.—The child whose mealtimes have always been treated in a matter-of-fact way is not likely to develop faulty food habits. Wholesome food, properly prepared, and given to the child without special comment but with the attitude that of course he will eat it, usually produces the desired results. If the food is not eaten after a reasonable interval, it is probably best to remove it. If the child is still hungry he usually learns by experience and eats without delay at succeeding meals. Such a procedure, carried out calmly, will do much to prevent feeding difficulties. The child who finds that, by refusing his food, he can create an exciting emotional situation centering about himself tends to repeat this behavior until every mealtime becomes the occasion for a scene of coaxing, tears, threats, or anger, upsetting to both the child and adult. Missing a meal or two is far less likely to harm a child than are such emotional scenes often repeated.

Food Prejudices.—Food prejudices may arise from any of a number of causes. As noted before, burned or otherwise

unpalatable food served once may prejudice the child against that food when it is served again. An emotional upset at a meal may be the reason for subsequent refusals of dishes which were served at that meal. It is unwise to discuss food dislikes in the child's presence. Children are quick to imitate their elders, especially those of whom they are particularly fond, and a chance remark that "Mother can't drink milk," "Father simply won't eat spinach," or "Aunt May never does take cereals for breakfast," may be the unwitting cause of the child's refusal of a food.

New Foods.—New and unfamiliar foods are best presented to the child with foods he is known to like, until he becomes used to them. Teaching the child to maintain an interested and tolerant attitude toward unfamiliar foods, and preparing him in advance when new foods are to be served, are advisable. The new food should of course be served in an appetizing way, so that the child can be told truthfully to "eat it, it is good."

Devices Employed by Children to Keep from Eating Food.—When children have developed capricious appetites or prejudices toward certain foods they will employ many ingenious devices to avoid or delay eating their food. Very slow eating, chewing but not swallowing, leaving the table to go to the toilet, playing with the food, and excessive conversation are often definitely schemed by the child so that he may not be required to eat. Denying the child his dessert until the main course is finished, or removing all the food and refusing more until the next regular meal if the delay is extended, have been found usually to be successful procedures in situations of this kind.

It sometimes happens that children who are finicky eaters at home eat without question whatever is set before them in the nursery school. The influence of other children is undoubtedly an important factor here, for most children are quick to conform to the behavior of the group. Absence of special adult attention is another factor, for the child in the school soon realizes that no one is there to supervise every mouthful and it is to his own interest to eat without waiting to be coaxed.

Importance of Serving Food Easy for Children to Handle.

—The ease of handling food may influence the amount the child eats. Eating utensils should be suited to the small hands and mouths of the children. Children's knives, forks, and spoons, made like the regulation eating utensils, but smaller in size, may now be obtained in many designs. The use of these from the first eliminates the need for learning to use two kinds of eating utensils, as is necessary when the child begins feeding himself with curved-handled "baby spoons" and "pushers." The food itself should be easy to manipulate. When, for example, lettuce is served shredded the children find the long strips hard to eat with a fork. A lettuce leaf which can be picked up in the fingers proves much more satisfactory. Diced beets are also difficult for the children to eat, either with fork or spoon, but sliced beets, which can be speared with the fork, are easily dealt with. Peas offer a similar problem, which can be solved by serving them in a nest of mashed potatoes or as a purée.

It is essential that the child be accustomed to different types of food so that he can learn to chew properly and can exercise his teeth and gums. Tough foods are not advisable, but vegetables, certain raw fruits, bread crusts, toast, and other foods which offer some resistance to the teeth, are useful aids in teaching mastication, for mastication must be learned.

While it is not necessary consciously to consider all these points at every meal, it is well to have them in mind so that feeding difficulties may be avoided or, at least, their causes understood in time to make the proper adjustments before habits are established.

Sleep.—The importance of sleep habits at this period has been emphasized in the White House Conference Report,¹⁷⁶ "Growth and Development of Children," Part I, as follows:

"Younger children tend to sleep more quietly than older children, and the maximal activity is found at about the onset of puberty. There are also indications of sex differences, seasonal differences, and other points of interest which should be greatly illuminated by the research now in progress.

"There have been many observations on groups of children

to determine the number of hours of sleep which children of various ages take. Foster, Goodenough, and Anderson of the Institute of Child Welfare, University of Minnesota, sent a questionnaire to parents asking them to report the total hours of sleep, the hours of sleep at night, and the sleep at nap time. The ages of the children ranged from six months to eight years, and the results indicate the averages from 1186 replies. No sex differences were observed. They reported their results.

TABLE XV

HOURS OF SLEEP OF 1186 CHILDREN SIX MONTHS TO EIGHT YEARS OF AGE

Ages in years.	Total.	Night.	Nap.
6 mos. to 1.....	14.01	11.14	2.48
1 to 1½.....	13.22	11.20	2.01
1½ to 2.....	13.21	11.23	1.57
2 to 2½.....	12.48	11.04	1.43
2½ to 3.....	12.29	10.57	1.29
3 to 3½.....	12.16	11.03	1.14
3½ to 4.....	11.57	10.59	.58
4 to 4½.....	11.48	11.07	.42
4½ to 5.....	11.36	11.00	.37
5 to 5½.....	11.22	11.13	.12
5½ to 6.....	11.09	10.57	.15
6 to 6½.....	11.04	11.02	.06
6½ to 7.....	10.57	10.55	.07
7 to 8.....	10.55	10.54	.05

"As children grow older they become more and more sensitive to external conditions, and it is important to develop in them the habit of disregarding these stimuli in order that the habit of sleep at regular intervals may remain uninterrupted. In the nursery school children observed by Chase and Blatz it was found that the younger children who had not already established good sleeping habits were easier to train than the older children, and that after a short space of time children slept without any relation to the number of other children in the room and in spite of many external stimuli.

"If from the early months of life children become accustomed to disregard the immediate environment during the sleeping period, and they need not be protected from sound, from light and other changing conditions, nor will they become dependent upon identical immediate surroundings, the same bed, the same position of the bed in the room, the same covering, and

as they grow older they will not rely upon a particular toy or object to be taken to bed with them or a repetition of motion, such as rocking, or of sound, such as singing, to produce sleep. Regularity in the hour of going to bed must never be broken, and when it has been ascertained that the child is comfortable he must be left alone to go to sleep by himself.

"Emotional factors influence sleep as children begin to make adjustments to their environment. The attitude of children toward sleep should always be pleasant. They should not be punished just at bedtime, and there should be no suggestions given of fear connected with the dark or with being alone. Adults must not talk about sleeplessness before children. Too great excitement just before bedtime makes sleep more difficult. Oversolicitude on the part of the parents and constant demands by the children for attention after going to bed at night indicate poor training and always interfere with good sleeping habits. It is much easier to establish good habits than to correct bad ones.

"Regularity in the daytime nap should be continued for all children up to the fourth or fifth year, and longer if the child sleeps at this time. After the fourth year of age the child should be awakened at the end of one and a half hours if a longer nap interferes with the night sleep. There should be a regular time for going to bed at night, and this must be early enough to insure an adequate number of hours of sleep.

"The child must cultivate independence of any particular environment or association with sleep, and must be able to disregard factors in his environment which, if they were allowed to do so, might prevent sleep. There must be freedom from undesirable emotional conditions which tend to produce wakefulness, such as excitement just before the rest period, fear associated with sleeping environment, or unpleasant associations of punishment."

SUGGESTED QUESTIONS

1. If possible measure the height and weight of three or four children who are two or three years of age and of the same sex. Compare these measurements of each child with the other children and with standard tables.
2. Observe for a half day the motor, language, and social activities of a three- or four-year-old child. Compare these with your previous ob-

servations of a twelve- to eighteen-months-old child. What implications can you draw from these observations and comparisons?

3. Make an inventory of the indoor and outdoor clothing worn by the child observed for question 2. Make an inventory also for a child of the same age but opposite sex. Criticize the adequacy of the clothing in each case.

4. Make a day's menu for a three- or four-year-old child suggesting quantities to be served. Appraise this menu for energy value and for vitamin, mineral, and protein content.

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CHAPTER VI

GROWTH DURING THE LATER PERIOD OF EARLY CHILDHOOD

Rate of Increase in Height.—It has been found that children at Merrill-Palmer School will show the increases in standing height for boys and girls from three to five years of age to be 5.3 inches for the boys and 5.4 inches for the girls. The rate of increase per year for both sexes has decreased as compared with the rate shown in infancy and the period of early childhood. This decrease in rate is characteristic of the growth of children, in general, as has been shown by investigators in the field of child development. The greater number of studies of weight and height have been made among school children and adolescents. However Baldwin and Wood, Woodbury, Faber and the Children's Bureau have made notable contributions to the preschool field.

The range in height for boys according to Merrill-Palmer measurements at: Three years is from 35 to 40.4 inches; three and one-half years is from 36.3 to 41.7 inches; four years is from 37.7 to 43.8 inches; four and one-half years is from 39.2 to 44.9 inches; five years is from 40.7 to 45.5 inches.

The range in height for girls according to Merrill-Palmer measurements at: Three years is from 33.8 to 40.3 inches; three and one-half years is from 34.8 to 42.2 inches; four years is from 35.8 to 43.6 inches; four and one-half years is from 37.2 to 44.7 inches; five years is from 39 to 45.7 inches.

The Children's Bureau standards of standing height for boys and girls from three to five years represent a larger and more unselected sample of the general population. It will be seen upon consulting Table XXX, Appendix, that the Merrill-Palmer boys and girls are about 1 inch taller at three years and 1.3 inches taller at five years than the Children's Bureau standards.

The difference in weight between Merrill-Palmer boys of

37.6 inches and boys of 42.9 inches is 7.8 pounds (see Appendix Table XXVII), the difference in weight between Merrill-Palmer girls of 37.1 and girls of 42.5 inches is 8.8 pounds. The gains corresponding to these increases in height are shown in the Children's Bureau Standards (Table XXX) to be for boys 7 pounds and for girls 6.9 pounds.

During this period there is a marked change in the proportion of body measurement, the increase in total length being largely in the legs. This is evident in the ratio of stem length to recumbent length, or the stem-stature index, which is 59.3 for average boys at three years and 56.8 for boys at five years as shown in Table X, page 164. The child now shows much better muscular coordination, handles his body with ease and grace. His activity has increased greatly and the energy demands become heightened.

Energy Needed.—A study of food intake covering seven consecutive days for 57 boys and girls between three and four years showed the average for the group to be 1509 calories or 45 calories per pound of body weight. A study of the food intake for the same number of days for 44 boys and girls between four and five years gave an average of 1585 or 41 calories per pound of body weight. These averages are similar to those obtained by Rose, Robb, and Borgeson¹²¹ for the same age nursery school children and slightly higher than some of the standards in general use. Records of the gains in height and weight of these children over a twelve month period showed that the average increase in height and weight for the group equaled or exceeded the average increase in height and weight for the Merrill-Palmer School, indicating that the energy value of the food intake had been adequate for the energy requirement of the children of these ages.

Meeting the Food Requirements.—By the time the child has reached this period he should have all his temporary teeth and the habit of mastication should be well established. The food served can be less finely divided and the variety increased to include almost all the vegetables eaten by the other members of the family. The child can now take his meals with the family and should be permitted to do so. It is desirable to give him his sugar in fresh and dried fruits which not only

afford the simple sugars suitable for him to have, but also the minerals and vitamins as well as cellulose which adds bulk to the diet.

Carbohydrate Intake.—The amount of carbohydrate in the food intake of 124 preschool children as revealed by a study made at the Merrill-Palmer School was shown to be 5.5 Gm. per pound of body weight at three years and 5.08 Gm. per pound of body weight at four years. There was wide variation in the individual intake of carbohydrate; for the three-year-olds the range was from 3.6 Gm. to 8.7 Gm. per pound of body weight; for the four-year-old from 2.8 Gm. to 7.6 Gm. per pound of body weight. This indicates the widely differing food choices in families and the individual differences which should be recognized. A detailed study of the item in the diet revealed that the carbohydrate had been taken in the form of cereals, vegetable starches, whole wheat bread and fruit sugars. Very little cane sugar had been used and not an unusual amount of white bread. These are desirable forms in which to secure carbohydrate since they combine starch or sugar with minerals, vitamins and cellulose. It is well to plan to include a raw and a cooked green vegetable in both the midday and the evening meal, since it is possible to insure the day's carbohydrate requirement and not secure at the same time as large a supply of minerals and vitamins as the child needs. There is every reason to believe that the mineral and vitamin demands of the body are just as insistent at this time as in any of the other periods mentioned.

Fat Intake.—All available information indicates that it is wise to give only moderate amounts of fats, probably not over 1.5 Gm. per pound of body weight. This is best offered in the fats which contain satisfactory quantities of vitamin A. If a child receives a quart of milk a day, a small amount (1 ounce) of butter, one egg, and the fat which is found in his other foods he will receive very close to his daily fat requirement. The range for fat intake per pound of body was greater than in carbohydrate being for three-year-olds from 0.08 Gm. to 3.1 Gm. for four-year-olds 0.6 Gm. to 2.7 Gm. Analysis of the reports showed that families differed most widely in amount of butter used and number of buttered vegetables.

Protein Intake.—The total amount of protein eaten by children of these ages, as shown by the study of 124 children, is greater but, the amount per pound of body weight is about the same as the younger group consumed, namely 1.58 Gm. per pound. The range of protein in the diet of children of these ages is from 0.89 to 2.46 Gm. per pound of body weight in the three-year-old group and from 0.71 Gm. to 2.12 Gm. per pound of body weight in the four-year group. The chief difference in the diets seemed to lie in whether the child had meat, eggs and milk daily or egg and milk. The protein needs of the child can be met by taking a quart of milk, a whole egg and the protein in other foods. There seems no sufficiently justified reason for withholding small amounts of meat from the diet and it is desirable to substitute meat and fish occasionally for eggs.

Rose, Robb and Borgeson¹²¹ in their investigation of the diets of 163 nursery school children attending the nursery school maintained by the Child Development Institute of Teachers College, New York, made a study of the distribution of calories made by six food groups. Their findings were:

"Children whose food intake showed a distribution of calories approximating the median value for each group had an excellent dietary, adequate in protein, calcium, phosphorus and vitamins, although not as high in iron and vitamin B as may on further investigation prove to be desirable. Children with less than 40 per cent of their total calories from milk did not have an optimal intake of calcium and sometimes not of phosphorus. Those with low milk tended to higher sugar and meat, foods which are deficient in growth-promoting properties. The intake of fruits and vegetables is greater than a standard formerly proposed for diets of low cost. It would seem from the study just made that over 15 per cent of the calories of these young children's diets may well come from carefully selected and prepared fruits and vegetables which will increase the intake of vitamins B and C and of iron. To provide for the regular daily addition of cod liver oil for the sake of its rich supply of vitamins A and D, a somewhat higher allowance of fat seems desirable. A new standard distribution for nursery school children is therefore suggested, as follows:

	Percentage of total calories.
I. Foods from cereal grains	18-20
II. Milk	45-55
III. Fruits and vegetables	16-22
IV. Fats and oils	4-8
V. Sugars	1-3
VI. Eggs and meats	3-5

Quantity of Food Eaten by Children.—The average child of these ages according to our studies takes from $\frac{1}{3}$ to $\frac{1}{2}$ of a cup of green vegetables, of soups, of custards, of desserts, a whole orange or apple, a poached egg or $\frac{1}{3}$ to $\frac{1}{2}$ of a cup of creamed egg. The quantity of food which the child will take whether $\frac{1}{3}$ to $\frac{1}{2}$ of a cup will depend somewhat upon his appetite, his general physical status and his attitude toward food. It is undoubtedly a better procedure to offer a smaller quantity of food and have it eaten willingly than to insist on a larger amount of food that may be more than the child at that particular time can be expected to eat. The children tend to eat the foods they are accustomed to and to refuse the foods to which they are unaccustomed.

Behavior Problems at Mealtime.—It is not unusual for the child when he is first permitted to join the family for meals to indulge in a type of behavior which may be very trying to the other members of the family. For many months because of his very physical dependence he has had to be fed and waited upon; when he comes to participate in the family meals he still desires to be the center of attention. If he finds himself ignored he will resort to almost any device to secure adult consideration. Refusal to eat, temper tantrum, dawdling, bargaining about his food, "he will eat carrots if he can have ice cream," are some of the kinds of behavior one is likely to encounter in the child at this period. Many children dominate their parents and the rest of the family in an unbelievable manner through their refusal to eat. A matter-of-fact, firm manner will do much to bring to the child a realization that there are some things in life which must be done, and eating is one of them.

POSTURE OF YOUNG CHILDREN

Postural Defects May Occur Early.—Too little research study has been made in the posture of children between the ages of two and five years to formulate any satisfactory conclusion. When a child has bowlegs or marked knock knees the aid of an orthopedic surgeon has been sought but little attention has been given to the body posture of the average child.

The common idea has been that postural defects such as pronation, flatfoot, prominent scapulae, were outgrown and were temporary aspects of development. It is true that certain postural conditions may accompany development, but it does not argue that all such conditions are necessarily aspects of development.

Incidence of Postural Defects in a Preschool Group.—A study of the postural defects noted in 350 examinations of normal children made by the same physician showed the following results:

TABLE XVI

UNPUBLISHED STUDY "INCIDENCE OF POSTURAL DEFECTS IN PRESCHOOL CHILDREN AT MERRILL-PALMER SCHOOL"

Age.	N.	Kyphosis, per cent.	Prominent scapulae, per cent.	Forward head, per cent.	Forward shoulders, per cent.	Lordosis, per cent.	Scoliosis, per cent.	Knock knees, per cent.	Bowlegs, per cent.	Flat feet, per cent.	Pronation, per cent.
24-29	24	8.3	0.0	8.3	16.6	8.3	0.0	62.0	45.0	12.4	83.0
30-35	44	11.3	4.6	9.0	22.3	6.8	0.0	74.0	27.6	11.3	72.0
36-41	46	17.0	15.0	0.0	15.0	17.0	0.0	82.0	34.0	3.3	82.0
42-47	64	12.0	14.0	7.8	29.0	17.0	0.0	71.0	22.0	6.0	54.0
48-53	62	27.0	38.0	4.8	54.0	22.0	4.8	51.0	24.0	4.8	69.0
54-59	48	34.0	48.0	22.0	48.0	25.0	10.4	54.0	13.0	2.0	54.0

It is evident that kyphosis (round back), prominent scapulae (shoulder blades), forward shoulders, lordosis (hollow back) and forward head appear to a more marked extent in the four- to five-year-old group than in any preceding age groups. Bowlegs decrease markedly from 45 per cent in the two-year-old children to 13 per cent in five-year-olds, on the other hand knock knees decline only from 62 per cent in the two-year-old children to 54 in the five-year-old and pro-

nation from 83 per cent in the two-year-old to 54 per cent in the five-year-old.

Increase of Postural Defects.—In 20 cases who were examined by the same physician and were seen from two years of age to five years of age by him the percentage of cases showing prominent scapulae, forward head, forward shoulders, lordosis,

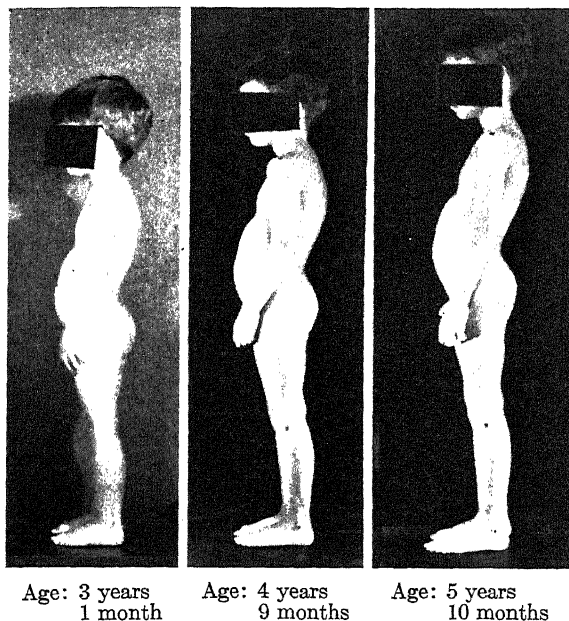


Fig. 23.—Showing the same poor postural pattern of a child at different age levels. Note the sharp angle of pelvic tilt, prominent abdomen, lordosis, round back, flat chest, forward shoulders, and forward head.

trebled and the percentage of kyphosis increased six times. The percentage of knock knees declined from 70 per cent in the second year to 38 per cent in the fifth year, bowlegs from 25 to 15, and pronation from 75 to 61.

It would seem that, whether viewed from the larger number of cases or from the small number of cases followed through a period of years, pronation, kyphosis, prominent scapulae, for-

ward head, lordosis tend to appear and increase as the child grows older and do not correct themselves.

SLEEP

Although the sleep habits of children should be thoroughly established by this age parents seem to be in doubt whether the number of hours of sleep on lower age level should be maintained. Such questions as: "How long should a child of two to three years sleep?" "As a child grows older should he sleep fewer hours?" "At what age should a child take the responsibility for going to the toilet during the night?" "How many times during the night should a child be taken up to prevent the wetting of the bed?"—are frequently asked.

Authorities differ conspicuously in their recommendations regarding the number of hours of sleep for children of these ages. For example, some authorities recommend as little as eight hours of sleep for a young child; others recommend fourteen.

In recent years studies made by research groups have shown uniformity in their results and the standards set by these studies seem more satisfactory than those suggested in the literature.

TABLE XVII
LENGTH AND NUMBER OF NAPS TAKEN BY 1186 CHILDREN

Age in yrs.	Length of nap (when taken). Minutes.	Number of naps a week.	Percentage tak- ing no naps.
2 to 2½.....	111	6.4	0
2½ to 3.....	113	5.3	7.4
3 to 3½.....	105	4.6	12.5
3½ to 4.....	102	4.0	16.7
4 to 4½.....	99	2.9	34.2
4½ to 5.....	90	2.5	31.7
5 to 5½.....	83	0.8	70.3
5½ to 6.....	87	0.9	72.1
6 to 6½.....	84	0.1	88.6
6½ to 7.....	54	0.3	90.5
7 to 8.....	...	0.1	

Naps.—The study made by Foster, Goodenough and Anderson⁴¹ referred to on page 190 gives the hours of night sleep. The same authors made a detailed study of the midday nap.

The length of the nap in minutes when taken, the number of naps a week, and the per cent taking no nap at all are given in Table XVII. After two years of age it was found that there was a slight tendency to sleep less at night among children who had taken a long nap during the day. It was also found that the children who took no nap at all or who took a nap only for a few minutes had a definite reduction in the total number of hours of sleep in the twenty-four hours, that is, the night sleep did not compensate for the loss of the nap.

Of the 4767 children without any day naps the per cents of those taking less than twelve hours' sleep at night were as follows:

	Per cent.
2 and 3 year olds.....	42
4 and 5 year olds.....	66
6 and 7 year olds.....	80

Those taking less than ten hours' sleep at night were as follows:

	Per cent.
2 and 3 year olds.....	1 in 17
4 and 5 year olds.....	1 in 12
6 and 7 year olds.....	1 in 7

Does the Five-Year-Old Have as Much Sleep as the Three-Year-Old?—Interesting data were furnished on the hours of sleep by Gardner's⁴⁴ analysis of home reports made by Merrill-Palmer parents. Some 3000 records of normal children were studied, the reports giving the number of hours of sleep, kind of sleep, whether the child had to be taken up to urinate. These records covered the period from October 11, 1926, to February 1, 1927, a period which included many variations of weather, marked changes in humidity and temperature, and opportunity for long play periods out of doors as well as for only very short ones. The records came from two nursery schools, one of which had children varying in age from twenty months to three and one-half years, the other having children of three and four years of age. The summary of the records studied showed that the children of the younger group average eleven and sixty-one hundredths hours of sleep, and the children of the older group eleven and fifty-three hun-

dredths hours. Although the general impression is that the younger children sleep a larger number of hours the actual averages of the two groups showed very little difference. These figures were within a few minutes of the amount found by Blatz and Bott¹⁶ and in the "Minnesota Study." Since Gardner's conclusions are made from 3000 records from homes with which the school was in daily contact and the trustworthiness of similar records had been known it would seem reasonable to base advice to parents concerning the number of hours of sleep on these findings. The results are more significant because the children in these schools are known by medical examination, laboratory tests and daily observation to be in a state of health.

A Study of Restless Sleep Among Children of Different Age Levels.—One of the interesting facts revealed by Gardner's study was that there were three and one-fourth times as many nights of restless sleep recorded among the younger children as among the older ones. Among the older group the records of only 13 children showed restless sleep: Six of the 13 children accounted for 76 per cent of the restless sleep. Five of the six were very active, strenuous boys, who frequently found it difficult to sleep during the school nap period. Among the younger children twice as many children showed records of restless sleep as among the older ones. Records of one third of the group showed 53 per cent of the total restless sleep. Of this one third more than half were boys, not of the vigorous active type as in the older group, but boys who had had some disturbance such as tonsillitis or abscessed ears. Among the young children 52 per cent were taken up from the bed and taken to the toilet during the night. Among the older ones 40 per cent were taken up.

Gardner draws the conclusion that "There is no evidence that the child of five needs less number of total hours of sleep than the child of two. It may be more convenient from the family's point of view for this sleep to be taken at night, although for the welfare of the child it would seem desirable that the night sleep of eleven and one-half hours be supplemented by rest of at least one hour during the day."

ELIMINATION

An Established Rhythm Is Important to Achieve.—The problem of getting parents to patiently establish a daily rhythm of the bowels, to realize that it is as natural and as necessary as the sleep rhythm or the hunger rhythm, is an educational task demanding tact and faith. Much of the education has had to be by means of personal interview and has had to be repeated many times before home procedures have been changed. A very definite hindrance to the acceptance of the education has been the widespread approval and use with children of laxatives or cathartics. Some children are regularly given a cathartic every night and have been receiving one since babyhood, the parents apparently not realizing that the cathartic habit is being formed by the child and the serious physical disadvantages of peristalsis induced by drugs. They state that under normal conditions the child is unable to have a bowel movement without the aid of laxatives. Several factors seem to have played a part in the development of such a physical condition. One is the failure to form the habit of systematically drinking water during the day. Some days many of the children will drink adequately, other days scarcely a half pint will be consumed. The two reasons most often given by the parents are that the children do not like to drink water and that to drink water makes them wet the bed at night. Another factor causing difficulties in elimination is that the great majority of family dietaries are lacking in bulk as well as in vitamin and mineral content.

Number of Daily Bowel Movements.—There is a good deal of confusion about the number of bowel movements to be expected and the hour desirable for the establishment of the rhythm. Many individual physicians advocate widely different practices. Some insist that two or more movements daily are essential for health, others that a movement every two days is satisfactory. Some insist on morning rhythms, others on evening rhythms.

To secure some satisfactory foundation based on observation of Merrill-Palmer children a study⁴⁴ was made of 1973 records submitted by the parents of children in two nursery schools from October 11, 1926, to January 31, 1927. The

children studied here were the same children as were studied for sleep habits.

It was found that in the older group 75.76 per cent averaged one bowel elimination daily and that 24.26 per cent averaged more than one daily, although only a very small per cent had two daily movements regularly. Among the younger children 31.18 per cent had two movements daily. Among the older children 42 per cent had a bowel movement in the morning and 58 per cent in the afternoon or evening. In the younger group the percentages for time of day were the same. From this Gardner concluded that one movement a day was satisfactory for the health of these children and that the hour at which the movement occurred varied depending on the hour at which the rhythm had been established.

MOTOR COORDINATION

All Motor Skills Advance Toward Perfection During This Period.—In studying the motor skills of children from three to five years of age we notice practically all of the abilities discussed in the last chapter still in the process of development, but definitely advanced toward perfection. Children from three to five years of age have smoother movement and better general coordination; they are lighter and more graceful, more rhythmic in movement. They can skip, balance, walk on a straight line, run on tiptoe quietly, ascend and descend stairs with alternating feet and without holding the banister. They can operate an "exerciser" or a toy airplane which require several types of movements at once, advancing, turning, backing with skill. They can climb ladders, "skin the cat" on a turning pole, swing standing up; can rake leaves, and "straighten up" a yard or a room efficiently.

Four-year-old children can care for themselves at the table excepting for spreading bread and cutting things with a knife; they can care for themselves at the toilet if their clothing is reasonably simple; cannot only undress themselves completely but can dress themselves if helped with long underwear under stockings and similar difficulties. There are few published studies to show just what speed and skill should be expected from children in dressing, washing and other self-care activi-

ties but, of course, the speed and efficiency will depend upon general intelligence and amount of practice as well as upon the simplicity of the clothing and other similar factors.

Skill with the Hands and Ability to Express Creative Ideas Increase Rapidly During this Three- to Five-Year Period.—

The child can now build complicated structures with his blocks; can cut, paste, and draw so that he produces interesting beginnings in art work; he can model simple objects in clay or wet sand. It is interesting to see a two-year-old child playing with brush or pencil, scribbling over a page, delighted with the simple situation of moving his arm and leaving a visible trail behind it. Soon, however, he begins to differentiate stroke from scribble, and becomes interested in the total product before him. He masses his colors or his scribbles and strokes, sometimes covering a whole drawing page, sometimes announcing himself "all done" when only a small part of the page is finished. He seems, even before he is three years old, to have a feeling for the unity of his product. At three it sometimes occurs to him to name what he has produced; and at four he sometimes announces what he is going to draw or paint before he begins to work, and occasionally produces a recognizable resemblance to the object he has set out to reproduce.

Individual Differences.—Marked individual differences are evident at all ages and in all forms of motor skill, particularly the creative skills mentioned above. Some children can mark a clear rhythm at three years; an appreciable percentage of children can do it at five; most children have achieved this ability at six or seven; but a few never learn it. Gesell gives samples of four-year-old drawings of a man. They vary from a scribble or an imperfect straight stroke to drawings that are clearly recognizable, one having the type of detail and accuracy not often achieved before eight or nine years of age. Some children of seven or eight years cannot manage scissors well enough to cut along a straight line; yet many four-year-olds can cut accurately along the outline of a figure if the turns are not too fine and the grooves too deep; an occasional three-year-old can cut patterns. Some nine-year-old children are still unable to bathe or dress themselves; most five-year-

olds can do it; an occasional three-year-old is thus accomplished.

The Bases for Physical and Mental Efficiency Are Laid Early.—Although such differences in motor skill are often to be attributed to individual differences in innate physical or mental capacity, they are also evident among children who are mentally and physically average in capability, and are, in such cases, to be attributed to differences in interest and in opportunity for practice. One of the duties of parenthood is to see that children have freedom and opportunity for exercise and for the development of motor skills which will make them able to care for themselves efficiently, to accomplish work successfully, and to express themselves adequately. The basis of physical health which is laid in early childhood, the habits and skills of physical hygiene may determine his physical, and so in a real measure his mental and social efficiency in adulthood. The joy in physical movement, as well as the fixing of early skills contributes to the joy and skill in the sports and play of later childhood, and may make the difference in adulthood between the person who takes adequate physical exercise with enjoyment and the person who takes none.

PROGRESS OF SENSE PERCEPTIONS

Accurate Judgments of Distance Depend Upon Many Factors.—Some of the more complex perceptions are being built during the three- to five-year period. The perception of distance particularly is developing at this time. Like all perceptions, it is built through experience, and accuracy of judgment grows as other habits grow. An object is judged to be near or far depending upon:

1. The apparent size: large if near; small if far away. This can often be judged by comparison with known familiar objects like trees, houses, etc.
2. The clearness of outline: clear if near; hazy if far away.
3. The amount of detail visible: detail can be seen if near; cannot be seen if far away.
4. Vividness of color: colors appear saturated if near; more neutral if far away.
5. Number of intervening objects: few if the object being judged is near; many if it is far away.
6. The accommodatory and convergent strains on the eyes as they adjust to nearness or farness.

There are other criteria by which objects are judged to be near or far, but these are sufficient to give us some appreciation of the complexity of the perceptions by which distance is judged. Unless we stop to analyze such a judgment process we are likely to think that it is the function of an inborn capacity. Yet, we must realize that it is a learned function, and that skill with it is achieved only through experience and practice.

This Complex Judgment Can Be Learned Only Through Experience.—We can see how much judgment of distance is a learned function dependent upon habit if we change from a low, moist climate where density of atmosphere tends to ob-

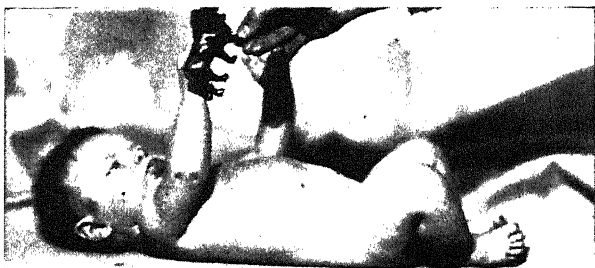


Fig. 24.—This three-months-old baby has finally directed his hands toward the object but has misjudged his distance and has therefore failed to obtain the object. Note the studied expression on his face as he concentrates at his task.

literate line and color, to a high, dry climate where clearness of atmosphere permits line and color to be seen over great distances. Distances are grossly underestimated in the clearer atmosphere. From such misjudgments come the many stories of eastern tourists who visit Colorado and start to walk "to Pike's Peak before breakfast" only to find themselves walking hours later but still miles from Pike's Peak. Accustomed to judging as only a few city blocks in distance the clearness of outline and vividness of coloring and detail that they see in the mountain peak, they find it hard to realize that under different atmospheric conditions their judgment can be in error by 20 or 30 miles.

Much Human Behavior That Seems Automatic Has Actually Been Learned in Early Childhood.—Judgments of distance probably show more clearly than any other type of judgment how much adult behavior which we take for granted as automatic or perhaps as innate is in reality the product of painstaking learning in early childhood. For an illustration of misjudgment of distance at three months see Fig. 24. A six-months-old baby reaches for a proffered toy, but neither his muscular adjustment nor his judgment of distance is good, so

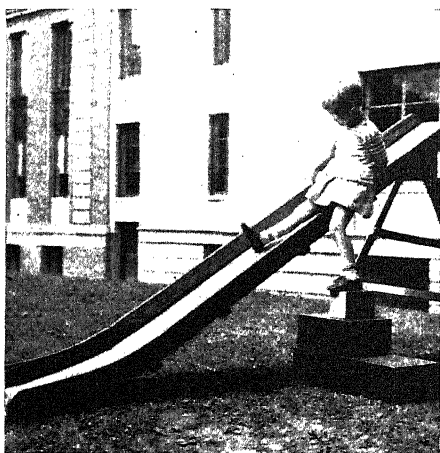


Fig. 25.—This four-year-old child has failed to realize that her own structure is less safe than the climb up to the top of the slide which she is endeavoring to avoid. She has also misjudged the distance from the block to the slide and is having difficulty to bridge the distance.

he may reach several inches beyond the toy, and may have to make several attempts before his hand closes over the coveted object. He soon learns judgment of shorter distances, but at a year he reaches eagerly for the moon, and seems unable to understand why it cannot be obtained. At three years his judgment of distance is still inaccurate enough to cause him to make many mistakes. He sometimes forgets that distance diminishes apparent size so that he comments on "the baby automobile," which he sees at some distance. But from three to five years

he makes such mistakes less and less frequently as he builds his understanding of the principles involved. The speed with which he progresses depends, of course, upon his native intelligence and upon his opportunity to learn.

Learning About Numbers.—Interest in number, although evident before three years of age, does not occupy the time and attention that it does after three. Some children display this interest sooner than others, although it would be difficult to determine without a carefully checked study how much of such an interest when it does appear is spontaneous and how much is reflection of adult interest in calling the child's attention to the concept of number. Children of eighteen months will often lay blocks or beads out in rows of two or three. We cannot be sure whether this ability is appreciation of similarity of size and shape of groups of two or three units to other like groups, or whether it is ability to appreciate that each group is made up of one and one or of one and one and one. Children of two can often be heard counting "one and another," or "one and one," or, sometimes, "one, two." After two years interest in language is at a peak so that one can readily teach a two-year-old child to recite the cardinal numbers up to eight or ten, or, with sufficient coaching, up to nineteen or twenty. This sort of recitation, however, belongs to the condemned category of "parlor tricks" since children of two or even of three years have no understanding of the meaning of number beyond "one," "two," possibly "three," and "lots." Although they can be taught to recite numbers "parrot fashion" they cannot without excessive coaching actually count a series of more than four objects until they are nearly four years old mentally, or of 13 objects until they are nearly six mentally.

Learning to Judge Time Intervals.—Perception of time develops very slowly and is expressed almost invariably through language so that its actual progress is difficult to measure. Judgment of time is probably the least accurate of all adult judgments although most adults fail to realize this fact. When we are busy and interested time seems to pass rapidly; when we are idle and bored time seems to drag. Failing to realize this adults are often unfair to children who not only find the

same thing true, but who have had much less experience with time than older people have had. A mother takes her child to call upon one of her friends, telling him to sit quietly while she visits. She is interested and time flies; he is bored and time drags. Half an hour seems only a few minutes to her, but hours to him, so that when he becomes restless or resorts to some means of entertaining himself she becomes impatient at his seeming unreasonableness. Again, she sits reading an interesting article when he asks if she will help him reach something he needs in his play. She answers, "Just a minute, dear," but continues to read. Several minutes later, after an interval that seems less than a minute to her but an endless time to him, she attends to his need. He gets very little help in judging "minutes" from such an experience.

Again, for example, the child is allowed to go out to play for "half an hour," and called to come in after what seems almost no time at all. Or he is told to sit quietly for "half an hour," and released only after what seems to him almost forever. "Half an hour" is indeed a variable quantity to a young child who has not yet learned to judge it with the objective aid of a clock. By the time he is four, however, he has learned that "a few minutes" means less than "an hour" or "several hours," although he still seems unreasonable when he is told that "we won't be going to town for a long time—not for several hours," but returns every half hour or so to ask, "Isn't it time to go yet?" When he is two there seems no other way of explaining "when Daddy will be home" than to tell him that it will be "after you've had your lunch, and have had your nap, and have played a long time," but at four years "afternoon" means after lunch, and "late this afternoon" means a long time after lunch, in fact, just before supper. At four he will understand when we tell him that "Daddy will be home late this afternoon." Questions like "When is noon?", "How long is half an hour?" "When is tomorrow?" are familiar on the lips of four-year-old children. "Yesterday," "tomorrow," "next week" still puzzle the four-year-old. Norsworthy and Whitely¹⁰² say that such complex time concepts as "last spring," "day before yesterday," "a month ago" are quite unintelligible even to six-year-old children.

The Problem of Dallying Due Largely to Inability to Appreciate Time Intervals.—Inability to appreciate time units produces a characteristic problem at four and five years, namely, the problem of dallying. Sitting indefinitely before distasteful foods, occupying endless periods of time at dressing, or at picking up toys, is a trait that causes a great deal of annoyance. After the newness of feeding himself, or of dressing himself has worn off, the task loses the interest for the child it once had and time drags. Add to this the clumsiness of fingers, comparatively skillful, yet in reality slow in dealing with exacting tasks, along with the inexperience which has not yet learned that uninteresting duties do not last forever, and the result is procrastination and dallying. Anything that revives interest in the task to be done will help; but the particular need of the dallying child is an appreciation that time passes, that the longer he spends in the performance of routine duties the less time he has for play. An hour glass with the sand constantly dripping, or a clock with hands that relentlessly tell the passage of time often help with this problem. A race with the sand or with the hands of the clock usually provides interest, and will surely make clear the fact that dallying only lengthens the time spent on routine and thus automatically shortens the time for uninterrupted play.

Music and Rhythm.—Advance in the appreciation of music and rhythm is rapid from three to five years of age. Ability to discriminate pitch, timbre, intensity, and interval, as well as skill in pitching the voice all grow quickly if the child has any special ability in this direction and if practice is given. Some children of three or four years have a response to rhythm which enables them to stamp, march, or sway in perfect time to simple music. A few can beat drums, clap cymbals, or shake a tambourine accurately enough to accompany music. Occasionally children have achieved control of the muscles which produce sound and have a sufficiently good sense of pitch to enable them to sing simple melodies at three, more complex ones at four. There is danger here, however, in the temptation to teach children "parlor tricks" in music. Many four-year-old children, having only a slight gift in

music, can be taught to sing dozens of nursery rhymes, or to dance an entertaining variety of jigs to music. Average or slightly superior children can, if sufficiently coached, be taught to recognize scores of victrola or piano selections, reciting even long French or Italian names glibly before they are four years old. This sort of thing gives the impression of great precocity; it sometimes even deludes us into expecting brilliant musical futures from such children.

The Surette School of Music at Concord, Massachusetts, made an admirable contribution to the teaching of music for young children when it took a stand against such artificial performances as those cited above. Mr. Surette believes that a feeling for music is more important than the mechanics of performance. Too great an emphasis upon academic memory tricks or upon mechanical reaction to music, he thinks, often interferes with true appreciation of music. Children must "experience" music with their minds, their bodies, and their emotions. He advises letting children hear good music, sometimes listening quietly, sometimes expressing themselves in bodily movement; but "coaching" should be avoided until the foundation in appreciation has been laid.

DEVELOPMENT OF REASONING

Do Children Reason?—There is a good deal of dispute about whether or not young children reason. Some writers say that reasoning is a complex mental process impossible for young children; others say that it is a mental process which grades in complexity from the simple trial and error problem solving of animals through the intricate associations involved in the solution of subtle mathematical and philosophical problems. One writer, Pierce,¹⁰⁷ in child psychology says that children do not reason before they are seven years old, and that it is, therefore, impossible to discipline them by any method involving reasoning before that time. Thorndike¹⁵⁵ says that very young children not only possess the requisite elementary processes involved in reasoning, but also the interest in reasoning. He says that we nip it in the bud by neglecting their questions, by making them accept mere words as explanations, by feeding to them the dry bones of mathematics and gram-

mar, and by teaching them to accept everything upon authority. "It is not the case that interest in reasoning comes late in youth; it comes early, but we restrain and dwarf it."

Young Children Often Reason in Actions Rather Than in Words.—It is evident that reasoning of a rudimentary sort is within the ability of fairly young infants if we consider the following example from Gesell.⁴⁸ Although not using the term "reasoning," Gesell describes under "adaptive behavior" how nine- to twelve-month-old babies recover a cube which has been covered over by an enamel cup. The test is described as follows: "The examiner takes one of the small red cubes and casts it upon the table to entice the child's attention. He may even allow the child to handle the cube for a moment. While the attention of the child is directed to the cube, the examiner swiftly covers it with an inverted enamel cup and placing the handle to the child's right, he notes the first reaction of the child to the cup." Gesell's comment on this test is enlightening: "This is undoubtedly a valuable performance test. Complicating and distorting factors are relatively few. The test is placed near the beginning at each of the schedules when nearly every child is much interested in the red cube. The mental processes required for the solution of this situation follow closely the paradigm of Binet's definition of intelligence, and it was most astonishing to find one six-month-old child who solved the situation, not only once but six times in immediate succession, exhibiting great zeal and concentration." Instances of such solutions of situations can be cited endlessly from random samples of observations of the behavior of children from a few months of age through childhood. Whether or not young children reason is then, not an argument of fact but a dispute over definition.

Successful Discipline Depends Upon Our Understanding of the Extent to Which Children Reason.—If we agree that a child reasons we shall not limit our discipline to the use of arbitrary force. We shall, rather, discipline him at each age level with increasing use of his reasoning capacity. One mother gives the following as an example of the use of reason in the discipline of a four-year-old boy: "Four-year-old Tom came into the house the other day with muddy boots and

marked up the entire kitchen, turned about and remarked it, seeming to enjoy the procedure immensely. I do not spank for such offenses, but insist that the damage be repaired. Tom knew this; so when he had finished his parade he immediately found cloths and set about cleaning up. He had not, however, realized that the joy of a few moments would exact in payment the whole of his play period. When he had finished his work he gave evidence that he had put cause and effect together as he announced, 'I guess I won't go out in the mud again.' Going in the mud gives Tom great joy; I am sure that if physical pain, *e. g.*, a spanking, had been the only result of his escapade he would have found the fun of the mud even stronger than the fear of pain, and would have continued to play in the mud. If physical pain is the only consequence of undesirable behavior children soon become callous to it, but the logical consequence of an act means constantly fresh experience—it commands attention, it exercises reason, it lengthens memory. Moreover, logical consequence is better than spanking, because life does not spank, but rather, exacts logical payment for error. Tom is not too young to learn this.”*

Examples of Various Types of Reasoning Shown by Children.—Most children of twelve or fourteen months have discovered that they can bring a dish on the table nearer by pulling the whole table cloth toward them; they have discovered the relation between tilting the bottle and getting more milk; they have made the association between having a hat on and going out of doors. Long before twelve months they have discovered the relation between arm movements and the noise produced by a rattle, between releasing their hold of a ball and its falling on the floor. These are all examples of an understanding of *cause* and *effect*.

Generalization and *application* come somewhat later; and it is possible that the slow development of these capacities has led some writers to conclude that all reasoning capacity is late. One need only to watch young children casually to conclude that their ability to generalize is not well developed. They must meet many specific situations, must be told about

* Mrs. Arthur Colten. Taken from an unpublished statement.

numerous specific instances before they are able to draw conclusions from them. The story of Skeezix and Pal, his dog, in the comic strips illustrates this. Skeezix was discovered using his toothbrush to scrub Pal's teeth. Uncle Walt tried to impress Skeezix with the seriousness of his offense and concluded, "Skeezix, you must never use your toothbrush on Pal." A few minutes later Skeezix was found scrubbing Pal's teeth as before, and upon being reprimanded said, "But, Uncle Walt, this is your toothbrush." Uncle Walt should have generalized for Skeezix, pointing out that no toothbrush should be used for anything but to brush the teeth of the person to whom it belongs; and should have explained as much of the reason why this is so as Skeezix could understand.

Only by giving children information in numerous specific situations, by teaching them the reasons for behavior in many specific instances, and many times drawing conclusions in such a way that they can understand the process, can we help them to the technic of generalization. The young child has not met situations in sufficient number to permit a cognizance of the similarities and differences by which general classifications are made. He does not realize, for example, that combs, toothbrushes, and wash cloths belong to the general class of "personal belongings," and are things that each individual uses for himself alone; whereas most chairs, books and other household furnishings belong to the general class of "family belongings" and are things which can be used by the family at large. Personal belongings are alike in the fact that they are used in the care of the person, and are different from family belongings as a class.

Experience Is Necessary as a Basis for Correct Generalization.—As the child gains experience with a wide variety of situations he becomes familiar with the elements of each, and gradually comes to discover how nearly similar or how widely different the elements in several given situations must be to permit classification or generalization. We can help him in this by extending his general experience, and by pointing out to him the essential similarities and differences upon which classifications are built. This must be done gradually, however, since young children are usually more confused than

aided by detailed explanations and complex patterns of thought, and can reach only the simplest and most obvious conclusions. It is important to realize in this connection that many of the experiences and conclusions familiar and obvious to adults are new and strange to young children; the very strangeness of details often requires the child's entire attention at times when we expected his attention to be occupied with conclusions.

Experience Is Also Necessary Before General Principles Can Be Applied to Specific Situations.—The child suffers a similar handicap in his attempts to apply general principles to specific situations. He lacks experience, and hence often cannot decide whether or not a given situation comes under a general ruling, or, still more often, does not even try to decide since the association between situation and principle never occurs to him. We explain to a three-year-old that he must remove his galoshes before entering the house because they track mud over the floors. He seems to understand and abides by the request for several weeks. When the weather becomes less severe, however, and galoshes are replaced by rubbers we are surprised one day when, apparently forgetting our request and his own good habit, he appears in the house wearing rubbers and leaving muddy tracks behind him. He is puzzled when we ask if he has forgotten that muddy overshoes are not to be worn into the house, and replies, "But, mother, you said galoshes. You didn't say anything about rubbers."

Wishful Thinking Common in Children.—The child's inability to generalize and to apply principles is also due to a habit of mind which leads him to think what he wishes to think rather than what the situation demands. Wishful thinking, as this is called, is a characteristic of immaturity, and is found not only among children but among adults who, although often brilliant in mental accomplishment, may be immature in personality. The child, wearing his rubbers into the house because he has misunderstood the generalization involved, may have thought that rubbers were not included in the rule partly because he wished to think it. Four-year-old Betsy illustrated this type of wishful thinking when, during a game

of papa and mama, the papa wanted a gun which she had found. She carried her point by saying, "No, you can't have it because I'm the mama and mamas carry the guns." In such an instance the child is not to be condemned for compromising with truth, nor even for a refusal to face facts, but should, rather, be led to see her error and aided to clearer thinking in the matter. If personality and mental growth are progressing on a basis of increasing independence and experience the child will eventually outgrow the part of his wishful thinking which leads him to errors of judgment.

Problem Solving an Important Type of Reasoning.—Probably the aspect of reasoning most universally agreed upon among writers as real reasoning is that of problem solving. Whenever a new situation for which the individual has no habitual reaction presents itself, the individual is said to be faced with a problem. As long as life flows along familiar channels where no new or unaccustomed action is demanded, habit serves all needs. But whenever a strange situation arises habit is powerless, a new solution or a new pattern of action is needed, and reasoning becomes necessary. The steps in such problem solving are usually listed as follows:

1. Location of the problem and determination of its nature.
2. Survey of possible solutions.
3. Selection of the most promising solution.
4. Trial of chosen solution.

An Example of Problem Solving by a Three-Year-Old Child.—These steps of reasoning are illustrated in an incident which occurred in a nursery school where each morning the children have tomato juice served in small dessert glasses. The glasses were being served from a low serving table to children seated in groups of four at individual tables. One child from each table was serving his table. Jimmie, aged three years, having been chosen to serve, carried glasses from the serving table to his individual table until everyone in his group had been served. But he did not count correctly and appeared at his table carrying a fifth glass which he discovered was not needed and had to be returned to the serving table. Meanwhile the children at all the other tables had been served, had drunk their tomato juice, and had returned their

empty glasses to a serving tray. Upon reaching the serving table Jimmie was faced with a problem: He must return his extra glass of juice to the serving tray, but the tray was full of empty glasses. He achieved step one in reasoning immediately: He realized where his problem lay, and could see exactly what the nature of his problem was.

He surveyed the situation (step two) as he stood holding the glass of juice and trying to figure out what he could do about it. An idea which promised to work occurred to him (step three); and he took the glass by its handle and tried to use it as a pusher (step four), pushing the other glasses about in an attempt to crowd them a little closer and thus to make room for his glass. This solution failed. He returned to step two, considering other possible solutions as he stood thoughtfully holding his glass. Once more an idea occurred to him (step three), and he tried (step four again) to pile his glass on top of one of the empty glasses on the tray. But the handle on the side of his glass caused it to tilt, and threatened to spill the juice. At this point experience with similar situations led him to realize that this solution was a failure because, although putting his glass of juice on top of another glass would get his glass on the tray (one aspect of his goal), it would spill the juice and thus defeat another important aspect of his goal.

Once more he stood holding his glass as he surveyed other possible solutions (another return to step two). Suddenly his face beamed. Apparently he had discovered another possibility (step three). He reached out and poured his juice into one of the empty glasses thus "saving it," and triumphantly set his now empty glass upon another thus getting it upon the tray. It could tilt now with no loss of juice. In his own mind he had achieved success in his problem.

Experience Is Necessary to Successful Problem Solving as Well as to Other Forms of Reasoning.—Jimmy's lack of general experience caused him to lose sight of one important factor in his problem. He did not realize that tomato juice poured into a used glass was not in reality saved, but must be thrown away. It is interesting to note, too, that this complex piece of reasoning, illustrating clearly every step of prob-

lem solving had taken place without a single word of language. It is clear that the ability to perform these steps of reasoning depends upon a general experience which places the individual in possession of a variety of facts, and which permits an accurate interpretation of facts in terms of their proportionate importance.

Necessary, also, is experience in the special technic of reasoning, viz., in the technic of analysis and synthesis of facts. An important contribution to the child's mental growth can be made if we permit freedom for wide experience with things, with people, and with situations. We must give him opportunity to solve his own problems, to do his own thinking whenever the situation involved is simple enough to permit a reasonably sound solution from the background of his limited experience, or whenever the risk of a wrong solution is not too great.

Experience Basic to Correct Reasoning Can Be Given Early.—If, for example, the eight-month-old baby drops his rattle, he is faced with the problem of recovering it. Unaided, he will make a variety of attempts to reach it, and will learn valuable lessons in the art of trial and error, and of finally selecting a good solution (steps two, three and four of problem solving). Moreover, if he succeeds as a result of his own effort he has the satisfaction of finding his own solution and this will make him more eager to attempt solution of the next problem that confronts him. If, however, we rush to him when he drops his rattle, restoring it to his grasp before he has had an opportunity to sense his problem, we rob him of an excellent chance to learn a valuable lesson.

If when he is eighteen months old, we permit him to handle his own spoon or cup, he will soon select from all the possible ways of holding them, the one or two ways which solve the problem of giving him food or drink successfully. If at three years he is permitted to cope with the problem of getting his blocks into a box he will soon learn the best way to fit them together. Consider the problem of an eighteen-month-old child who has been playing horse, and who has been running about dangling the reins behind him. He gives his imagination free play until the reins catch over

a stake in the ground thus impeding his progress. He is now faced with a problem. At first he is likely to behave much as an animal would under the same circumstances; he tugs and jerks at random, trying to pull himself free. If he has not the habit of attacking his own problems he will probably set up a lusty cry when he fails thus to free himself, expecting some adult to solve the situation for him. If, on the other hand, he has become accustomed to facing his own difficulties, he will probably pause in his struggles, examine the situation, discover that he must back up in order to release the reins, do so, and thus extricate himself.

We see a two-year-old riding his tricycle, going joyously forward until a wheel slips into a crack in the sidewalk and brings him to a stop. Again, he will behave according to his habit. If he has already the habit of dependence, of expecting someone else to do his thinking and solve his problems for him he will probably begin to cry in distress. If, however, he has retained his self-independence he will probably descend from the seat, examine the problem, and decide to do the necessary backing or lifting, thus solving his own problem capably, and then resume his interrupted activity.

Shifting Attention of Children Makes Reasoning Difficult.

—The character of children's attention also makes accurate thinking difficult. Children are likely to make certain characteristic errors in reasoning because their attention is too unstable to permit concentrated thinking. In spite of the fact that young children often give sustained attention to concrete materials for long periods of time, they seem on the whole incapable of entertaining abstract ideas in any appreciable sequence or for any long period of time. They may have all the necessary facts for solution of a problem, but unless some progress toward solution becomes evident fairly soon they are likely to lose sight of the goal, or are likely to become distracted by some trivial aspect of the problem.

When to Help Children in Their Thinking.—It is a fairly good rule to let children work on problems unaided if there is some appreciable chance that success will come with reasonable effort, but to give aid rather than to allow failure to occur too often. Failure means dissatisfaction and an increasing

unwillingness to attempt solution of problems, whereas success, especially success which comes as a reward for one's own effort, is a keen stimulant to further attempts. Aid should be given, too, whenever it becomes apparent that lack of motor ability or lack of ideas is about to produce discouragement leading to abandonment of the attempt, or irritation resulting in an explosion of temper. The child should not learn the habit of failure because he is too often faced with problems too difficult for his ability; nor should he give up problems before reaching solutions because solutions are too long delayed. He should not develop a habit of explosion in temper because the drive for success outruns his motor ability. He should learn none of these things from his experience with problem solving; but he should, rather, through ample experience with problems within the scope of his ability, develop habits of success, of persistence, of versatility in thought, and, most important, the habit of attacking his own problems willingly.

Reasoning Expressed in Words as Well as Actions.—At three years the child begins occasionally to express his reasoning in language, and at four he gives many examples of verbal reasoning which, unless we realize how usual this is at four years, may lead us to consider him unusually precocious for his years. It is not at all unusual to hear children of three years reason as did Barbara whose playmate, Blanche, looked out of the window at heavily falling snow and said, "Oh, see the feathers." Barbara said, "They're not feathers, are they?" and received from an adult the answer, "No, Blanche is using her imagination." Barbara was apparently much impressed with the word "imagination," and went about repeating it over and over. Later in the day she said, "If Blanche had said, 'That is snow,' would that have been imagination?"

Learning to Make Decisions Is Necessary to Mental Health and Should Begin Early.—Decision making is an essential part of step three in problem solving, and like all other aspects of reasoning, depends for its development upon practice and success. Adults who have never learned to make decisions find themselves seriously handicapped because of the trait of indecisiveness.

How to Make Decisions.—1. When, for example, a decision

is pending between choices A, B, and C, it is necessary to examine all the advantages of A, of B, and of C, and also to take account of all the disadvantages of each.

2. The advantages inherent in choice A must be weighed not only for number but for importance against the advantages inherent in choices B and C, and also against disadvantages in choice A; the same must be done for B and C.

3. The individual making the decision must choose, knowing that by virtue of his choice he is giving up the advantages of the choices he decides against, and accepting the disadvantages of the choice that he decides for along with its advantages.

4. The individual must believe in his decision sufficiently to act upon it.

Causes of Indecision.—This sounds complicated in a discussion which deals with young children who do not, of course, make decisions “by technic.” But if we are to aid them we must understand something of what is involved. Indecision may be due to failure in any of these steps.

In step one the individual may not know enough about the facts which are relevant to his decision to enable him to lay them out for examination. Or, he may not realize when he has gathered enough relevant facts to warrant a decision; or he may use as a way of delaying the effort of final decision the excuse that he has not yet enough facts.

In step two failure may result because of insufficient general knowledge upon which to base a judgment as to the importance of the various advantages or disadvantages involved. The individual may, in other words, lack the items of experience necessary to an evaluation of the advantages and disadvantages inherent in his present situation.

The most frequent failure in decision-making, however, lies in step three. Too few people have the strength of will to face the necessity of giving up advantages and of accepting disadvantages once a decision is made. They refuse to accept the fact that any decision necessitates the sacrifice of certain advantages in favor of others, and the acceptance of certain disadvantages. Indecisive people are often indecisive because they lack courage—courage to give up one set of advan-

tages in order to gain another, courage to accept disadvantages which inevitably accompany advantages. Courage of this sort should be learned early, and is probably the chief reason that children should have experience in decision-making while they are still young.

The strong belief in a decision which is spoken of in step four of decision-making and which is necessary before that decision can be acted upon, offers the final pitfall for the indecisive person. Many people can go through the pretense of decision-making as far as step four, can delude themselves and the world into thinking that a decision has been made, yet can procrastinate until the test of action never comes; and so, by this procrastination they can indefinitely postpone the actuality of decision-making. No decision is really made until it is acted upon, nor can any person who fails to act because he continues to wonder whether or not he has made the right decision, be said to have made a decision at all.

Practice in Decision-Making Is Necessary.—Children need practice if they are to learn decisiveness. They need to make the many little decisions apparently trivial to adults, but important to them. "What shall I play now?" "How can I make this tower of blocks stand straight?" "Where shall I keep my dollie?" Such decisions should not be made by adults but should be made by the child himself. He should have hours every day when the decisions of play, of simple routine living are entirely his responsibility. Every decision for which he has sufficient experience and judgment should be left for him to make.

The Types of Decision We Allow Children to Make Must Be Adapted to Their Ability.—Children should not, however, be permitted to make decisions in cases where they lack such experience, or where the consequences of a wrong decision would be too serious. The consequences of a too serious mistake may frighten a child away from attempting to make his own decisions again. Nor should the child be permitted to think that he is making decisions when in reality he is not; when, for example, we lend so great a weight from our own opinion that he is unduly swayed toward a decision which is not really his own but which he considers his own because he has phrased the final statement regarding it.

Neither should he be permitted to make decisions which he promptly retracts without appreciating that he has failed to act upon them. One mother, thinking she was training her two-year-old son in decision-making approached him each morning and said, "Son, will you chimb out of bed yourself this morning or shall mother lift you out?" The boy would answer, "You lift me out"; but as she approached to do so he would say, "No, I'll get out"; as she retreated, "No, you lift me"; and the process continued often as long as fifteen minutes. This child obviously was not learning decisiveness, but rather indecisiveness and an unwarranted sense of power over his mother. If she wished to train him to make decisions she should have acted upon his first request promptly and in spite of any desire on his part to change his mind.

Snap Judgments Should Not Be Confused with Sound Decisiveness.—In this connection it should be remembered, however, that when training a child to make decisions we must guard against letting him acquire the habit of making snap decisions under the delusion that he must decide all things quickly. Sometimes, led into error by America's slogan of efficiency, we force decisions, either in cases where sufficient facts are not available, or in such haste that whatever facts are available cannot be adequately considered. Many people consider themselves decisive when as a matter of fact they are only artists at snap judgments. It is probably better to be indecisive and to know it, than to consider oneself decisive and forceful when one is really only reflecting the opinions about one or is jumping to ill-founded conclusions.

SOCIAL AND EMOTIONAL DEVELOPMENT

Increasing Social Independence.—From eighteen months to three years, but particularly from three to five years, the expansion of the material, social, and spiritual selves continues rapidly. At this time the child begins a social and emotional weaning which is equally as important as the physical weaning which preceded it. The process of weaning from parents and home should come about gradually, beginning when the child makes his first venture into the world of playmates at eighteen months or two years of age, continuing

through all the experiences of the "gang age," and reaching completion with adolescence, at which time the individual should be capable of independent judgment in almost every life situation.*

Every normal child must, if society is to live and progress, be regarded as a potential contributor to society's progress. No group of people can maintain itself and advance in development if it carries an excessive number of nonproductive individuals. Modern society, organized on Christian principles, carries many individuals who are dependent upon it because they are physically or mentally incapable of maintaining themselves. So heavy is this burden of defectives that no appreciable weight can be added to it without threatening the general health of society. Every normal individual, then, must be taught to carry at least his own share if economic and social balance is to be maintained; and it seems reasonable to suppose that in order to compensate for the drain of defectives, persons of superior physical and mental endowment must carry a good deal more than their own share. Certainly society cannot long suffer its individual members to evade the responsibility of self-maintenance nor can it progress if its superior members fail to contribute more than they take from general welfare.

Social and Emotional Independence Must Be Complete in Adulthood.—Parents must think of their children as eventually becoming independent and contributing members of a social group. White, in his *Mental Hygiene of Childhood*, states this point clearly: "The whole process of the child's development has as its goal its emancipation from the parents, so that its own life may be free to develop to the fullest without the hindrances that are inevitable if there continues an attachment to the home that is in the nature of dependence upon it. A full, free development of the personality is only possible if it is free from crippling dependence of any sort. From this it follows that the problem of the parents in guiding that development can best be met only in the full

* This does not mean, of course, that the adolescent should presume to exclude from his judgment the wisdom and counsel of persons whose experience is superior to his own. No person is ever too old to profit from experience which is more extensive or more expert than his own.

consciousness of the object to be attained and the possession of enough love on their part to work unconditionally to that end."

This need not mean that in achieving growth of independence the child is to be weaned away from love of parents and home. Quite the contrary, for the child who can become gradually an independent personality within his home seldom feels anything but devotion and loyalty for parents who understand him so well and who prepare him for life so wisely. On the other hand if the child in his attempts to achieve independent development and social responsibility is met only with accusations of "disloyalty to his parents," and with repressive discipline which mistrusts his growing judgment and insults his growing maturity, he can do nothing but chafe against the restraint and break away at the first possible opportunity.

Parents Must Aid This Achievement of Independence.—Parents who are wise will grant freedom gradually and increasingly, and will welcome rather than resent signs of a desire for independence on the child's part. It is a natural temptation for parents to rejoice when children remain content to stay at home, to limit their social and spiritual contacts to the family. They are likely to speak with pride of the child who is devoted to his family, saying, "He's simply miserable when he's away from mother and me," or of the boy who "never has fallen in love with any girl—he's devoted to his mother." "He never plays with other children long; he'd much rather stay at home with me," affords the child's mother tremendous satisfaction; but it is an immediate danger signal to the psychologist whose profession makes him alert to signs of difficulty in mental or personality growth.

One mother who kept her robust five-year-old boy in long curls and Lord Fauntleroy suits betrayed herself in words as well as in deed one day when she brought him to school. He struggled until he released his hand from hers and, running joyously down the hall burst into the school room where, quite obviously absorbed in his plans for the day, he set to work immediately. The mother whose lip was trembling because he had forgotten "to say goodbye" stood in the door-

way where she attracted the attention of the teacher. "He seems very happy here, doesn't he?" was the teacher's attempt to make her feel better. "Yes, I'm afraid so"; and the mother lost control as tears welled up in her eyes. She had brought herself to enter him in school because of the pressure from her husband, her friends, and her own conscious mind, but unconsciously she wished him to be unhappy and incapable of interest when he was away from her.

Parents Do Not Always Realize When They Hinder This Growth.—The mother or father who brings a child to the nursery school, then stands bidding him intensely affectionate goodbyes until the child is worked into a frenzy of weeping over the tragedy of separation, is in reality gratifying his own unconscious wish that the child should be thus miserable at parting. The parent who meets the traditional demand that children be associated with other children yet who by criticising each playmate subtly destroys whatever affection the child may develop toward anyone outside the family is using an insidious weapon. Such parents may even appease their conscience by "inviting little friends" to their homes, or by insisting that their children accept invitations to visit elsewhere. Yet they succeed effectively in dwarfing each interest which would provide expansion of the social self beyond the home, each idea which would stimulate independent growth of the spiritual self.

It is interesting that some parents can stunt the growth of their children, can inflict or wish to inflict unhappiness. It is notable too that the very parents who talk most about devotion to their children and to "family life" are often the ones most prone to inflict such pain upon their loved ones. This can happen because emotions frequently blind intellect. No clear-thinking parent would consciously place insurmountable stumbling blocks in his child's path to progress. Yet, the wish to control all the life of a beloved person, the emotional jealousy of interests and persons who command a share of the loved one's attention are often more powerful than the intellectual desire to free that personality for growth.

In the Process of Growth the Child Must Meet Extra-familial Influences.—The first contacts outside of the home,

even those made when the child is only two or three years old, almost inevitably mean exposure to behavior and to ideas that differ from the ones taught at home. The child learns new games, new words, new mannerisms. In most neighborhoods the new learnings will fit the ethical code of most of the parents who compose that neighborhood, so that the major part of what the child learns outside the home, though different, will be acceptable. Some of the learnings will be different enough, however, to meet with disapproval. It is when this happens that the temptation to forbid extra-familial contacts becomes most severe. It is well to remember in this connection that not all standards which differ from our own are wrong, and also that even though a given child may have one or two undesirable traits much good can be found in all children. To forbid contacts may be to forbid valuable opportunities to learn these two facts about life.

Normal Social Growth Follows a Fairly Definite Pattern.—

As the self of the child develops he expands his interest, first beyond himself to the persons who minister to his physical needs, then to other members of his family or to few people who come into the family circle frequently. Usually he includes in his expanding love a few of his special possessions. Before he is three years old he has, if his contacts have been sufficiently varied, begun to direct part of his affection toward other children. At five years his contacts with other children begin to assume the appearance of "gang interest." At eight or ten, if his growth is normal, he is usually well established as a "gang" or "clique" member. Sheldon¹²⁹ in studying the social life of preadolescent children found 934 different societies or clubs among 1139 boys, and 911 societies among the 1145 girls studied. Puffer¹¹³ found among the thirteen-year-old boys he interrogated only 21 per cent who had never belonged to a gang. Norsworthy and Whitley¹⁰² think that "gang" activity is bound up with desire for physical activity, the love of adventure, and the interest in getting results which count, as well as with fundamental impulses to socialization. Anything in the nature of a pass-word, or of a "club-house," anything, in fact, which represents organization and secrecy is welcomed as an inherent part of the "gang" ac-

tivities. Although the child's impulse to lay stress on secrecy often tempts parents to suspect unwholesomeness, most of the secrets and activities of this age are thoroughly wholesome. Unless there is some especially pernicious influence at work in the "gang" parents will be wise to respect this phase of development of the individual personality, being ready of course to listen and to share, but never to intrude. Hollingworth⁶¹ refers to this age as the "Big Injun" age. Few connotations could better describe the general nature of activities common at this period.

At twelve to fourteen years of age the child enters the *early adolescent period* of social development. During the "gang" period loyalties to the gang and to certain ideals of courage and good faith have been intense but fairly impersonal and almost entirely sexless. With the advent of adolescence there is a renewal of intensity in personal relationships with the result that intimate and devoted friendships become the rule. The whole emotional life of adolescence is deepened and broadened, so that personal relationships are usually more ardent. At first the child devotes himself to members of his own sex, sometimes passing quickly from one intense friendship to another, or sometimes retaining a single friend for months. Hero worship is a usual accompaniment of the emotional friendships of early adolescence, the hero or heroes usually being chosen from among the child's teachers or older friends or from literature and history. Some children remain in the early adolescent period for several years; others pass quickly into the *later adolescent period* of social development, a period in which loves and loyalties are still intense, but now devoted to members of the opposite sex rather than to members of the same sex. This period serves to acquaint the child with potential mates and should, if well managed, give him sufficient experience with members of the opposite sex to insure a wise choice.

This Growth Prepares the Child for Certain Aspects of Adult Social Life.—Blatz and Bott¹⁶ in their book "Parents and the Preschool Child" say that "every child is born potentially to be the founder of a new family." It has been said above that each individual in society must maintain himself

economically and must contribute to general social welfare according to his ability and strength. If we accept these two goals of development—viz., the founding of a family (the biological goal), and contributing materially and socially to society's progress (the social goal), we can appreciate the main threads which should dominate the child's social growth. He must learn to make an adequate adjustment to mating, and he must prepare himself for vocational or professional independence from his parents. In other words he must become emotionally and intellectually weaned away from his home.

This development begins, or should begin, at twelve to eighteen months of age in the first acquaintances with people outside the home and in the first habits of self-maintenance like feeding oneself, caring for one's own toys, and so on. It should continue through the expansion of the social self in love of playmates, the loyalties to the gang, the friendship and hero-worshiping of early adolescence, and the devotions of later adolescence. The development should also progress in expansions of the spiritual self, and will do so as independence, self-control, and tolerance are learned through contacts with ideas and interests outside of the home as well as in the home. The child must grow from infancy to maturity; from infantile selfishness to mature altruism and tolerance; from naïve, explosive and direct expression of emotions to mature control and socialized expression; from complete dependence to independence and responsibility.

Progress from Infantile Behavior to Maturity Should Occur in Every Phase of Social and Emotional Life.—Physical growth brings about conspicuous changes which can be detected by everyone. Physical growth as a phenomenon of human life is, therefore, recognized and accepted by everyone. Mental growth, somewhat less conspicuous in its manifestations, is still, nevertheless, fairly evident. Most people recognize that children grow in intelligence, viz., learn more facts and become more skillful in meeting situations as they grow older. The fact of mental growth, although less obvious and less generally recognized than the fact of physical growth, is nevertheless fairly generally recognized. That personality grows as well is a fact not known to many people.

The general belief of the public at large is that personality is just something that descends upon us and about which we can do nothing. Psychologists and educators have only fairly recently discovered not only that social and emotional growth are possible, but also that they follow certain clearly defined patterns of growth. They have found, for instance, that this growth can be, and for the best personality development should be, steady, well-rounded and constant.

The manner in which emotions can and should grow is interesting. Growth toward maturity in emotional life may take place in two ways: (1) In a change in type of stimulus which excites any specific emotion; and (2) in an altered manner of expressing the emotion.

How the Emotion of Love Develops.—Consider, for example, the emotion of love. In the newborn infant the love emotion is roused by physical caress, a stroking of the skin or patting of certain specific areas. Between a year and eighteen months it is roused by ministration to the physical needs of the child. Expression of love at this level usually consists of return caresses, of cajoling smiles, and of demands for attention. Sometimes an individual never grows beyond this stage, but always remains in the state of love infantilism in which he devotes his entire love energy to physical caress and his entire love loyalty to the person or persons who wait on him, give him his own way, and protect him from all unpleasantness. Such individuals occasionally find mates who will meet them on the parent or nurse basis, but even so marriage is seldom successful for them, since expression of love on this level is too demanding and too selfish to permit happiness.

Various Childhood Experiences Contribute to This Development.—As the individual develops in love he should learn to be stimulated by ideas and interests as well as by caresses, and by the spirit and personality of another person as well as by his physical attractiveness. He begins to learn something of this if he is given an opportunity to know his parents in the rôle of persons as well as of "doting" caretakers, if he can meet and learn to love other children even though they, like himself, have selfish interests and refuse to sacrifice

themselves to his whims. Love in the gang is often roused by a situation which permits the child to "show-off" before an audience, or which permits him because of the "gang" or of the cooperation of particular members within the gang to achieve his own desires. Often he learns to use individuals or groups as a background for his own activities and as a means for accomplishing his own selfish purposes. He is likely to yield his own desires only as far as is necessary to win and keep his place in the group. His expression of love at this age is usually a blustering defense of his "gang," or an occasional self-conscious attempt to serve one of its members. In the "gang" he receives a fairly severe discipline in expression of the love emotion since he soon finds that physical caresses given to a "pal" or to members of his family in the presence of the "gang" meet with scorn. He must grow beyond the baby timidity which tempts him to cling to his mother's skirt, or to cry when he is bewildered or displeased, if he is to be acceptable to his contemporaries. Fortunately, his urge to meet the demands of his group is usually strong enough to motivate the necessary self-control.

Sometimes the Development Is Not Completed.—There are some people who never grow in love beyond the confines of their own families. When this occurs the social and emotional weaning has been incomplete. Such persons can never learn to love anyone who indulges them or "understands" them less completely than their families do. Nor can they conquer the tendency to run back to the protective atmosphere where childish weeping and infantile clinging dependence are tolerated. Some individuals pass beyond the family boundary into the gang stage, but never go beyond that. If so, they continue to demand the applause of a specific group, to depend for stimulation and motivation upon the "exclusive feeling" of secret societies or club life. They are ever ready to furnish ideas but seldom willing to make a real sacrifice to carry them out. The patient and continued love and understanding of individuals without which close friendship is impossible is beyond them. One hears these persons referred to as "the life of the party," yet usually finds them miserable and without resource when alone or when dependent upon one or two people.

Adolescent Experiences Also Have a Contribution to Make.

—Early adolescent friendships teach that kindness and service are the *sine qua non* of mature love, since in maturity one loves most the person to whom one willingly gives most. Adolescent friendships are often founded on the basis of admiration for accomplishment, for brilliance or richness of ideas, for soundness and beauty of personality. They should teach the individual to love mind and soul as well as body, to rejoice in the sharing of interests and ideas as well as of physical caresses. They should serve to stimulate expression of love in improved accomplishment, broader service, and richer development of the personality. They can, in fact, be considered sound and wholesome in proportion as they expand interests and enrich personality, and may be condemned as unwholesome in proportion as they limit interests and dwarf personality growth.

Many persons grow this far in love, developing a mature reaction to spiritual and social stimuli, accomplishing an almost completely socialized expression of love in service to society, but cannot bring themselves to the final achievement of the biological goal of social growth as expressed in the choosing of a mate and the establishing of a new family.

The Development of the Fear Impulse.—We have seen that the love emotion evidences growth which progresses in an orderly fashion toward ultimate maturity. The emotion of fear should grow, too, as the child becomes older. At first the infant fears only loud, sharp noises and removal of support and perhaps one or two other such simple things. He expresses his fear by clutching and screaming. Throughout infancy he remains afraid of things which threaten his physical body, and continues to express his fear in primitive fashion.

As he grows he soon learns to fear failure also, and thus becomes afraid of experiences which threaten his ego as well as those which threaten his body. His reaction when he encounters failure at eighteen months or two years of age is usually to cry and to seek the aid of the first available adult. Some people never develop physical courage; others never grow beyond that fear of appearing in an unfavorable light

which drives them to cringe or weep at the first hint of difficulty and to turn for help to the first available source. Such people hate responsibility because they fear it, and are continually shifting to other people whatever responsibility comes to them, thus showing their immaturity.

Courage Should Be Achieved.—As the child grows older, however, he should learn physical and moral courage, fearing only laziness, selfishness, intolerance, and other behavior which threatens his mental and social well-being. He should learn to control his desire to scream or weep, and should develop the fortitude necessary to face situations demanding physical or moral courage.

The Development of the Anger Impulse.—Anger, like love and fear, should grow. The newborn infant screams, and strikes out with his arms and legs when his random movements are inhibited. For several months anything which inhibits him bodily is likely to elicit screaming and bodily resistance. As his ego develops he becomes roused to anger by anything which thwarts or inhibits his activity in any way. If the stimulus is severe he reacts in a thoroughly primitive manner, screaming, kicking, throwing things. We recall that at two years of age the child is thwarted in many ways. Able to run about he is tempted to investigate everything within reach, and often begins an interesting inspection of some forbidden object which he must yield before he is satisfied. His misjudgments of size, shape, distance, weight, etc., often inflict pain or disappointment upon him. He encounters a multitude of occasions which thwart his activity and prevent him from carrying out his desires. Being only two years old he reacts directly and primitively.

People Do Not Always Grow Up in Anger.—Some people never grow beyond two-year-old behavior in anger. They become furious whenever thwarted in any way, are unable to tolerate resistance to any whim which possesses them. They express their anger in the two-year-old manner, viz., they have temper tantrums. Sometimes these are unmistakable two-year-old tantrums in which the individual screams or cries, kicks doors, throws anything within reach, or directly attacks the person of the one who roused anger.

Frequently the tantrums are slightly disguised,—the individual sulks, assumes a “hurt” manner, has a “heart attack,” faints, complains of pain, thus endeavoring to make the offender sorry and inflict mental rather than physical hurt upon the person who roused resentment. One tyrannical and thoroughly spoiled woman of sixty ruled her son whenever he displeased her by throwing herself on her knees and praying God to forgive such a thoughtless, selfish boy. Another parent, a father, ruled his family by fainting fits which came on whenever any member of the family dared to resist him in any way. In both of these instances prayers and fainting attacks deserve no other name than temper tantrums. The individuals who resorted to them were using the technic of the two-year-old child who is roused to anger whenever “things don’t go to suit him” and who expresses his anger in an explosive temper tantrum.

People who have grown to maturity in anger become angry only when they suffer injustice or when they sense that injustice and tyranny are being inflicted upon others. They should express anger in fighting for a cause, in “cooperative pugnacity,” as Norsworthy and Whitley call it, and in fighting through work for something which seems worth while. The fighting impulse should not be killed, since we do not wish an individual to be too long suffering, but it should be guided from the physical to the spiritual level, and should come to serve as motivation for worth-while accomplishment.

Parents should appreciate the need of growth in the emotional life of their children, and should understand the stages through which that growth progresses. Otherwise they may fail to permit development or to provide a setting for it because, although they see the need of physical weaning, they cannot bring themselves to wean children emotionally.

The Development of Relationships to Social Groups.—Growth toward maturity in one’s relationship to social groups takes place also in an interesting way. Children from a few months of age enjoy playing with or near other children. They recognize or “notice” each other, occasionally playing with each other in the sense of touching or caressing, or of offering a rattle one to another. But after the first novelty of an-

other child wears off the play becomes highly *individualistic*, each child occupying himself with his own activities in almost complete disregard of the other.

From eighteen months to two years the child continues to be absorbed in individual play but is more influenced by the presence of another child. Characteristic play of this age is sometimes referred to as *parallel play*, for each child, although apparently playing quite by himself usually plays at the same type of game which occupies the other children of the group. Not only does he play the same game, but he plays at it longer and has more resourceful ideas than he



Fig. 26.—These three-year-old children are playing alone and yet together. Each is working on her own project in the sand yet each occasionally exchanges a spoonful of sand with the other. It is at this point that parallel play merges into group play.

would if playing alone. A favorite game at two years is digging in sand or dirt. One child fills his pail, carries it a short distance and empties it. Another child, who has been digging only, adopts the idea of filling a pail, fills his pail, carries and empties it. There has been no exchange of words, but simply an exchange of ideas.

The Beginnings of Cooperative Play.—The next step to greater socialization may come when the second child conceives the idea of emptying the pail on the same pile of sand with the first child, thus changing the activity from a purely individualistic emptying of pails into a cooperative building of a mound of sand. This change may take place in silence

or may occur after an exchange of words, and may last for several minutes or may relapse into individual activity almost immediately. Sometimes a brief socialization is evident when one child says, "Let's play in the sand," but dissolves when the idea is carried out since each child occupies himself in almost complete disregard of the others.

A few months later at about three years of age these children exchange ideas more frequently and more obviously. "Let's play blocks. I'll build a garage." Another child answers, "All right. I'll build mine over here." Again separate projects will be undertaken, but now there is an almost constant recognition of the presence each of the other, and a flow of conversation. "See, mine's big." "Oh, look, I made a roof." Perhaps there will be a temporary merging of projects. "Look out, my car's going to visit your garage."

At three to four years the *shifting group* is conspicuous. Under this arrangement a fairly loosely organized game may grow up, lasting throughout a whole morning or even for several days, entertaining the activity of a number of children, but depending upon the presence of no particular child. For example, child A may say, "Let's play store." Child B and child C like the idea and join with A to build walls and counters with the blocks. D may appear, watch for a moment, and having learned what is happening, begin to carry blocks. The project is so loosely organized that his appearance causes no confusion, nor is the absence of B felt when he drops away to play for a time with his kiddie car. Child E may join the game, and A and C may go off on some individual project, leaving the store game intact with D and E but with none of the original children. Later B may return. The game goes on with one child or with several, each individual coming or going at will. This type of game is typical when children are getting their first practice at socialized play yet still feel the charm of solitary play in which they can execute their own ideas in their own way. It finally develops into *well-organized group play*.

As the Organization of Group Play Becomes More Fixed Certain Characteristic Relationships Appear.—The children who play together frequently soon fall into fairly definite

positions within the group. Buhler* refers to these relationships as those of leader, of cooperating companion, tolerated companion, or rejected companion.

The *leader* is the child who furnishes most of the accepted ideas and whose wish dominates the play. He proves acceptable to the other children who are willing to follow his lead and who generally rather uncritically admire him. The child who dominates a group through bullying, and hence who

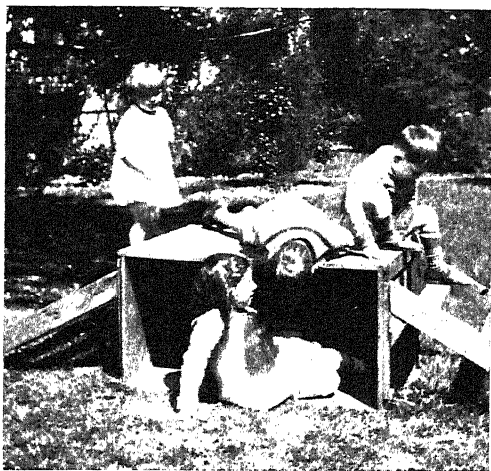


Fig. 27.—This group of three- and four-year-old children are dramatizing "Three Billy Goats Gruff." They are cooperating in the process and illustrate the fact that group play often occurs among young children.

rules by fear, cannot be called a leader in any constructive sense.

The *cooperating companions* are those who are always sought by other children, and who stand in a position of cooperation with the leader, often offering him acceptable ideas, and sometimes as the game changes or a special type of leadership is required stepping temporarily into a position of leadership. These children are usually thoroughly resourceful, and are not afraid to criticize or even to ostracize the leader when occasion arises.

* Buhler, Charlotte, from a lecture given at Merrill-Palmer School.

The *tolerated companions*, though seldom sought by the group unless they are needed to "fill in," are occasionally permitted to play even when their services are not particularly needed. They are not usually resourceful, and seldom have acceptable ideas to offer. As a rule they are so pleased at being allowed to play that they are willing to play at any post or in any capacity assigned to them by leaders or cooperating companions. When the group or the game changes they sometimes graduate into the positions of cooperating companions but seldom into a position of leadership.

The *rejected companions* are what their name signifies,—rejected by the group. Sometimes they really wish to play but have had too little experience to know how. If this is the case they usually soon learn and may become cooperating companions or even leaders. However, they are rejected sometimes because they are entirely lacking in skills and ideas, sometimes because they have been so overprotected or overindulged at home that they cannot mould themselves into an acceptable social pattern. Occasionally such children have a strong enough gregarious impulse to make them conquer even bad home training and to face the discipline necessary for successful social contact. They usually suffer intensely in the process of remoulding their habits, but sometimes succeed remarkably well. A child who is strong enough to bring about such success usually has the qualities which equip him for leadership, and may progress rapidly to that position in the group which once rejected him. A rejected companion whose parents fail to help him realize and conquer the reasons for his rejection is indeed in a sorry position since he will either continue to crave companionship he does not know how to win, or will retreat to the consolation of family protection to spend the rest of his childhood trying to fool himself into believing that he never cared to play. The degree to which he succeeds in fooling himself in this respect often determines the degree to which he is neurotic in later years.

The Child Who Has Succeeded in Adjusting to His Peers Has Taken an Important Step in Growth.—As the child meets his contemporaries on an acceptable level he progresses in the

emotional weaning from his family, and builds extensions of his spiritual and social selves. The period from three to five years of age is ordinarily one of rapid development in this respect. It should be a time when he asserts himself as an individual with at least some degree of success. He should not, of course, become "bossy" and "intolerable" since such traits can only inhibit his growth toward successful social individuality, but he should meet occasional success in his independent strivings if he is to continue in the development of his independent personality. It is fairly usual for these independent strivings to take the form of boisterousness, of "showing off," and of fighting. Most fathers appreciate the ultimate value of such behavior in their sons and wish to encourage a certain amount of it. But most mothers grieve when it appears, fearing that their sons will never grow up to be "gentlemanly." Both mothers and fathers tend to discourage such behavior as "unladylike" in girls. Parents should not, of course, encourage or even tolerate crudeness, or rudeness to adults or to children, nor should they permit fundamental disrespect toward adults in any instance. Most mental hygienists, however, consider a certain amount of competition and striving among contemporaries a thoroughly wholesome preparation for desirably aggressive forms of behavior necessary for success and poise in adulthood.

The Development of the Moral Sense.—By three years of age conscience or self-judgment has become clearly evident. Young children have no other judgment for what is right or wrong than a reflection of the beliefs of persons about them. At three, however, they have already abstracted from general experiences a certain sense of what behavior will be acceptable and is therefore "right," and of what behavior will be disapproved and is therefore "wrong." By four and five years the child has a fairly clearly defined sense of "right" and "wrong" as thus determined. If discipline has been consistent they will have some idea of the magnitude of various offenses, and this will be defined in their minds in terms of the severity of punishment which follows each infringement. Parents should lend all possible aid to the child's attempt to form judgments of right and wrong by giving him consistent

disapproval for undesirable behavior, and consistent approval for desirable behavior. To laugh at him one day and scold him the next for the same bit of behavior can give him no sense of the desirability or undesirability of the behavior itself but only a skill in judging adult moods.

Again, parents should help the child to a sense of proportion as to degrees of rightness and degrees of wrongness by approving or disapproving in proportion to the magnitude of the behavior. To punish him as severely for making finger marks on the window pane as for beating another child when he is in a temper can only give him the idea that the two offenses are equally serious. Young children are ordinarily extremely conventional; they have a strong desire to do the "right" thing. Children who persist in undesirable behavior do so for some definite reason, and not because such behavior is natural to them. It should be borne in mind, however, that young children lack experience, and therefore cannot be expected to behave in a manner acceptable to adults under all circumstances.

Good Moral Judgment Achieved Only After Long and Consistent Experience.—To expect or try to force perfect behavior and perfect judgments of right and wrong from a very young child is to court trouble. A thorough and consistently dependable judgment about what is "right" or what is "wrong" depends upon training and experience, but it cannot in any case be expected before the child reaches adolescence. Sometimes the child becomes discouraged with his inevitable failures to meet too rigid standards of right and wrong and gives up trying, perhaps even resorting to actively "bad" behavior to convince himself that at least in this he can succeed; sometimes, on the other hand, he becomes morbidly conscientious.

One parent became overanxious to fix all the right judgments early so that no undesirable ideas would have an opportunity to find root. She never read her child a story that she did not analyze the "rightness" or "wrongness" of the behavior of the various characters. The child never reported an instance from his play or from his thoughts that she did not question, "Was that right?", "Did the little boy do the

right thing?" At six years of age her child had become so reticent, so timid, so thoughtful that he was not sleeping, was having haunting dreams, could not digest his food, was, in fact, quite ill physically and mentally. Investigation by the clinic to which he was brought revealed that the child had gotten into a morbid state of self-analysis and was terrified lest he think or do something "wrong," was dreaming that he was a "wicked" boy, and so on. It took two years to convince this child that many things he did or thought were just day to day living and did not deserve analysis, and that even if he did make some mistakes he could hope to learn from them but need not feel irrevocably lost because of them. This child must pass through the emotional changes of adolescence before the clinic can be sure that the damage done so early in life by an overconscientious mother will not be permanent.

The Development of Sympathy.—A child of five should have had sufficient experience with other people so that he can project himself into their thoughts and feelings with approximate accuracy. At three one child may bite another, being entertained by the resulting scream, but having no idea whatever that the other child has been hurt and is in pain. At five he should understand clearly that other people think and feel much as he does, that other people have rights and desires as important as his own. Sympathy, based on such understanding and upon the joy of helping other people to happiness, should be part of his behavior. This is an age when it is fairly easy to teach joy rather than envy and hatred for other people's happiness and success. Sometimes in trying to do this, however, we praise other people too much and the child under consideration too little, thus rousing resentment. Sometimes we hold other children before him as models until he learns to hate both the model and the behavior represented, and to sullenly envy the person who is thus constantly praised. He will soon learn to repeat praise of success, however, if he hears his parents occasionally praising their own competitors. He will learn it, too, if whenever he is happy over the success of someone he loves, his happiness is accepted as desirable, thus encouraging him to

share in celebrations of success. Too often good marks on sister's report card are an automatic signal for a scolding about the poor ones on brother's, rather than an occasion for rejoicing over sister's success and the hope that brother's own card will soon warrant a similar celebration.

MEANING OF HEALTH

The Ultimate Goal of Growth and Development Is Health in Its Widest Sense.—A discussion of growth and development should not close without some understanding of the ultimate goal of that growth and development. This goal is the attainment of health, and involves not only a knowledge of the principles of health but also an application of these principles in daily living. It includes health of mind and personality as well as of body, and should be understood not only as the health of each of these considered separately, but also as a balance between them and an integration of all of them. It means, too, much more than the mere avoidance of illness, physical or mental, since the goal toward which we wish growth and development to proceed is abundant, vital health.

Physical Health.—The healthy person has plenty of vitality with which to meet the daily demands made upon him, so that he can do a good day's work and meet the strains of a strenuous day of contacts without undue fatigue or boredom or irritation. More than that, a person who has achieved positive health is not only capable of meeting daily demands but has a reserve which helps him to meet physical, mental, or emotional crises without disaster to body, mind, or personality. Physical health must mean that the individual can work each day without greater fatigue than can be overcome between the end of one day and the beginning of the next. It must mean, in addition, a physical reserve of vitality which will carry the individual through a physical crisis like a severe illness or an unusual demand in work.

Mental Health.—Likewise, in mental health the individual must have enough mental balance and strength of personality to meet the demands of daily living without boredom, irritability, decreased efficiency, or other symptoms of mental or

emotional overfatigue. He should be able to meet each day's living with interest, poise, and efficiency. In addition to this, however, as in physical health, the mentally healthy person should have enough reserve to permit him to live through mental and emotional crises without disaster to his mind and personality; he should be able to meet crises of disappointment, grief, strain, and unusual responsibility without mental or nervous breakdown. Such health is the product of continuous growth, and should be inherent in an understanding of growth and development. Soundness of body, mind, and personality comes, as growth proceeds, to be more and more an expression of healthy living, and should be so regarded.

Rôle of Heredity and Prenatal Care Important.—To achieve optimal physical, mental, and personality health the individual should be endowed with a sound constitution and a sound nervous system, which presupposes a sound heredity and good prenatal care. He should have an environment which affords adequate nourishment and adequate (although not excessive) stimulation, with opportunity for constructive play, for a reasonable amount of freedom, and for contacts with his peers. There should be not only opportunity to learn but also situations which afford satisfaction in learning. Sufficient physical, mental, and emotional rest with enough solitude to challenge self-resourcefulness are essential, as are opportunities for independence, for responsibility, for adjustments to various personalities, and for practice and development of pride in self-control. The growing person should have in addition to all these an abundance of good example set for him by the adults and by older children in his environment.

Periodic Health Examinations.—Parent and educators may be assisted greatly in the guidance of health by periodic health examinations. These examinations should cover mental and social as well as physical aspects of growth, and should serve:

1. To detect defects (physical, mental, and emotional).
2. To protect against disease or disorder (physical, mental, emotional).
3. To secure through a comparison with standards and a

consideration of individual children's needs a basis for determining present and future growth needs.

4. To secure a basis for judgment of what may be expected of the child at present and in the future.

5. To furnish a basis for decision in regard to the child's daily routine.

Balance of Physical, Mental, and Personality Health Is Vital.—But more important even than the achievement of physical, mental, or personality health is the achievement of a sense of balance between these aspects of growth and health. Optimal health of body, mind, or personality is closely related to optimal health in all three and to a fine balance in the interrelation of all three. This does not mean that the child should learn to live a stereotyped routine which balances physical, mental, and emotional growth needs by hours or by effort expended. It does mean, however, that because parent or educator has a keen sense of proportion, the child learns to evaluate and to adjust the various demands that are made upon his body, his mind, and his emotions, and that he learns to keep a proportionate evaluation between these demands. This sense of proportion does not come easily, but should develop gradually as any other growth process develops. Through it the child should gain a constantly accumulating and expanding power to live healthfully. This probably comes to the child best as a sense of participation in life, a feeling for right living which is the result of living the physical, mental, and emotional experiences in balanced proportion until such living becomes an integrated part of his being.

Integration the Goal as Well as the Means to Health.—The ultimate product of such integration should be a person in sound physical health who is capable of:

Self-expression guided by self-control and consideration for others.

Development of initiative with wise choice of energy expenditure.

Independence modified by intelligent recognition of authority.

Good mental and social habits with power of adjustability.
Adaptability to routine without slavish compliance.

A pragmatic attitude without loss of vision, spontaneity, and ability to create.

Family loyalty with appreciation of wider social needs.

Tolerance without sacrifice of standards.

Facing of himself without morbid introspection.

Social adaptability without complete social dependence.

Satisfaction from, and joy in simple activities.

Unselfishness and a sense of social responsibility.

The achievement of durable satisfaction in living.

SUGGESTED QUESTIONS

1. Observe a group or, if this is not possible, one or two four- or five-year-old children, noting:

(a) What kinds of things they do when indoors; when out of doors.

(b) Their general bodily skills; their use of their hands.

(c) How well they take care of themselves at the table, in putting on wraps, etc.

(d) What they talk about; the size of their vocabularies, the types of sentences they use.

(e) How they play with other children.

(f) How much self-discipline and emotional maturity they have achieved.

2. Compare these observations with those made in Chapters IV and V. What conclusions can you draw from these comparisons?

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CHAPTER VII

THE BIOLOGICAL DEVELOPMENT OF THE CHILD

ONE who studies the development of children is interested in changing, growing, living things. Background for this approach, though difficult to achieve, is of the greatest practical importance. The person best equipped to deal with the constant emergencies of which the care of children consists is not the one who has mastered a manual of precepts about health and care and problems of behavior but is the one who has interpreted these precepts through a broader, more unified understanding of the nature of a child as a living human being. This understanding is ultimately all that the parent or teacher really has to depend upon in making the many small decisions which must be made daily. The more sound and integrated this understanding the less capricious will be the management of the child. This intelligent consistency on the part of parents and teachers is a by-product, in action, of a point of view which cannot be arrived at by any other method than gradually building up a concept of the child's real nature. The zeal to understand what a human being is and what makes him the way he is leads one into fields not familiar to the untrained person. A knowledge of the mutual relationships existing between the structure and functioning of the body all during life and those between the individual and his environment is indispensable. So much that is pertinent has been discovered in the relatively recent past that it has not yet become part of the knowledge which is widely disseminated. It is the privilege of the students of the present to use some of this formerly unavailable material in the fashioning of their points of view. Not to use it is to fail to avail oneself of those discoveries of modern science which distinguish this period from the Victorian era. The knowledge about man is so specialized now that the statement of vague generalities about him is no longer suitable. The scientific

approach is characterized by its method which is one of observation and experiment. The material about the nature of man which is of real scientific value is limited because of the inadequacies of the known technique for determining the physical and mental nature of the individual and the parts played by the many factors which influence the course of his development. Because (1) humans can be used as experimental material in only a limited fashion and because (2) the life cycle is so long and the (3) number of progeny so few and the (4) influential environment so intricate, this species is most difficult to deal with in an accurate scientific manner. And yet we must use these methods critically to produce valid results.

The Human Being as an Organism.—We are too likely to take for granted the organic nature of the human being and build up a superstructure of ideas which is not sound because it is not built upon a foundation of concepts of living which are broader in their application. Man is only one of countless numbers of kinds of living things. From one point of view they all may be looked upon as very intricate mechanisms which take in food and build and repair and reproduce themselves and move and are otherwise responsive to changing conditions within themselves or between themselves and their surroundings. A man also is an intricately organized material thing. The individual as we see him is an object resulting from the processes which have taken place in him in the past. What is the nature of the processes and the parts in which they occur? It is common knowledge that parts of the body work together for the performance of certain functions essential to the maintenance of life.

- I. The digestive system—(1) for the making of food soluble that it may pass through the body to be used as fuel and building material, (2) for the absorption of what has been digested, and (3) elimination of the remainder.
- II. The circulatory system—(1) which distributes via blood to all the remotest parts of the body food, oxygen, hormones, disease-resisting substances, and (2) collects waste liquids and gases.

- III. The respiratory system—where the blood in the course of its circulation comes into contact with air that it may be replenished with oxygen and relieved of its carbon dioxide.
- IV. The skeletal system—which serves as a supporting framework and is protective to certain parts, *e. g.*, brain, eyes, ears, heart, etc.
- V. The muscular system—which accomplishes movement.
- VI. The nervous system—which coordinates the action of muscles and glands in relation to changing conditions.
- VII. The endocrine system—which aids in coordination of action of parts by producing hormones which are carried by the blood and affect the general body chemistry, rate of growth, or more specific reactions.
- VIII. The excretory system—which removes from the blood nitrogenous wastes which have been produced in all parts of the body and collected by the circulatory system.
- IX. The reproductive system—the glands in which potential germ cells are stored and the passages ways for these cells to pass to the exterior.

In all of these systems the things that can take place are determined by the nature of the parts themselves, *e. g.*, the circulatory system can function because the blood is fluid, because the blood is within a closed system of tubes, because parts of the tube, the heart, are sufficiently muscular to propel the blood, because the distribution of the finer branches of the closed tubular system is such that blood must pass through lungs, kidneys, walls of the digestive tract as well as to all other parts of the body. In their more detailed structure also the parts are suited to their functions. Each part is made up of many minute units, the cells. Each cell consists of parts which are regularly arranged in a definite fashion. There is typically a central portion, the nucleus (kernel), of denser consistency made up mostly of chromatin (so-

called because it takes stain). Outside the nucleus is another region of less dense material, the cytoplasm. The cytoplasm

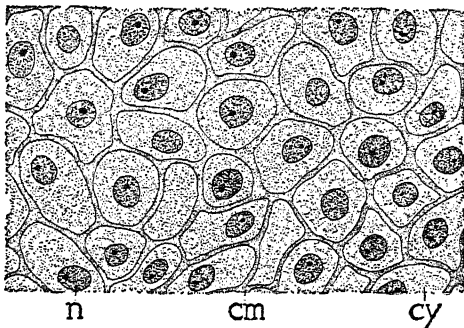


Fig. 28.—Cells of an animal tissue (from musk-gland of alligator), fixed, stained, and sectioned. *n*, Nucleus; *cy*, cytoplasm; *cm*, cell membrane or intercellular substance. (Plunkett, "Outlines of Modern Biology," Henry Holt and Co., Publishers.)

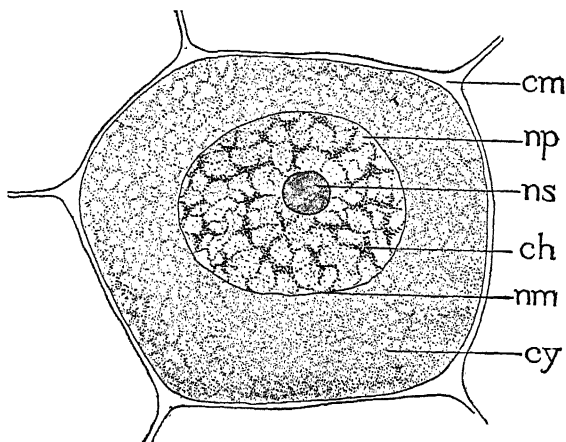


Fig. 29.—A cell similar to those of Fig. 28, more highly magnified. *ch*, Chromatin; *np*, nucleoplasm or nuclear sap; *ns*, nucleolus; *nm*, nuclear membrane; *cy*, cytoplasm; *cm*, cell membrane. (Plunkett, "Outlines of Modern Biology," Henry Holt and Co., Publishers.)

of cells of various sorts appears different. That of muscle does not look like that of bone or blood or nerve.

ILLUSTRATIONS OF TYPES OF CELLS IN BODY TISSUES

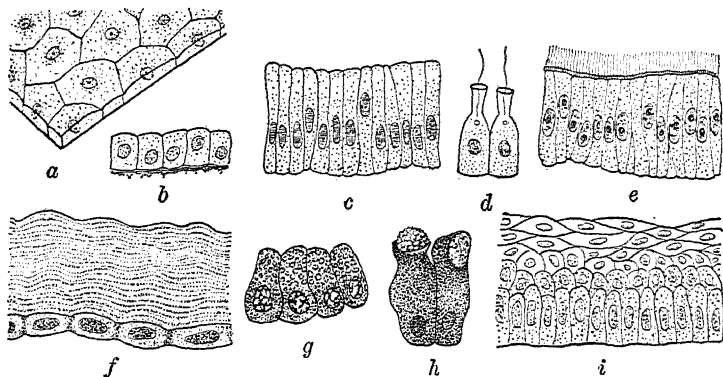


Fig. 30.—Types of epithelial tissue: *a*, Squamous or pavement; *b*, cubical; *c*, columnar; *d*, collar cell from flagellated epithelium; *e*, ciliated; *f*, cuticular; *g*, glandular; *h*, goblet cells of glandular epithelium; *i*, stratified. (Guyer, "Animal Biology," Harper and Brothers, Publishers.) These form coverings and linings and function as protective, absorbing, and secreting surfaces. Those specialized for secretion are called glands (see Fig. 31) and usually grow away from the surface and enclose a place in which the secreted cell product is collected.

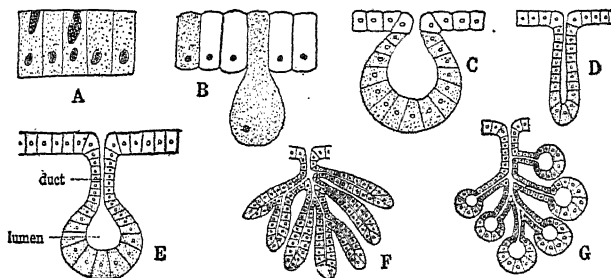


Fig. 31.—Types of glands: A, Single gland cells; B, unicellular gland; C, simple saccular gland; D, simple tubular gland; E, simple alveolar gland; F, compound tubular gland; G, compound alveolar gland. (Guyer, "Animal Biology," Harper and Brothers, Publishers.)

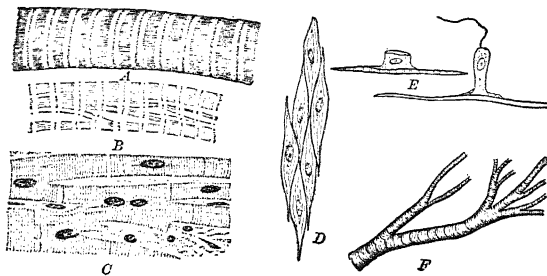


Fig. 32.—Types of muscular tissue: *A, B*, Striated; *C*, heart muscle; *D*, nonstriated; *E*, epitheliomuscular cells of coelenterates; *F*, branched, striated muscle fiber from base of frog's tongue. (Guyer, "Animal Biology," Harper and Brothers, Publishers.) By the shortening of the parallel cytoplasmic fibrils of these cells, the shape of the cells is changed and movement of the part to which they are attached is accomplished.

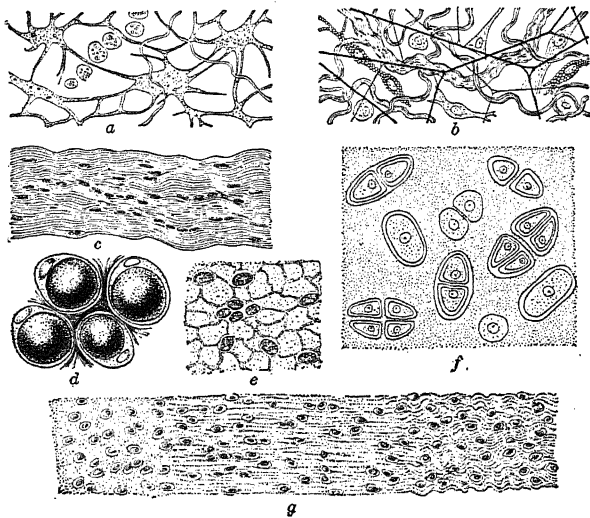


Fig. 33.—Types of connective tissue: *a*, Gelatinous; *b*, areolar; *c*, fibrous tissue of a tendon; *d*, adipose; *e*, reticular; *f*, hyaline cartilage; *g*, transition from hyaline cartilage (left) through fibrocartilage to white fibrous connective tissue as seen in the head of bone in a ball-and-socket joint. (Guyer, "Animal Biology," Harper and Brothers, Publishers.) In all of these there are nonliving products between the cells. When these products are hard, the tissue is used for support or to bind parts together, *e. g.*, bone, cartilage or fibrous connective tissue. When it is liquid, it is used for transportation of materials, *e. g.*, blood.

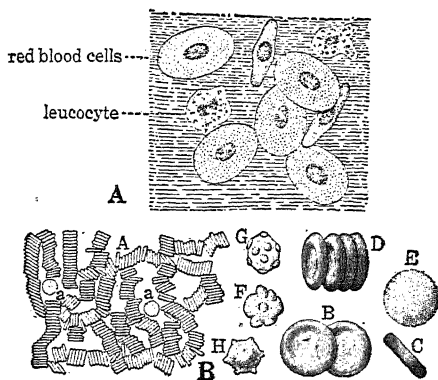


Fig. 34.—A, Blood of the frog, highly magnified (after Conn). B, Blood corpuscles of man: A, Red corpuscles in *rouleaux*, a, a, colorless corpuscles, magnified about 300 times; B, red corpuscles more highly magnified; C, view of edge; D, three-quarters view; E, red corpuscle swollen with water; F, G, H, distorted red corpuscles (after Huxley). (Guyer, "Animal Biology," Harper and Brothers, Publishers.)

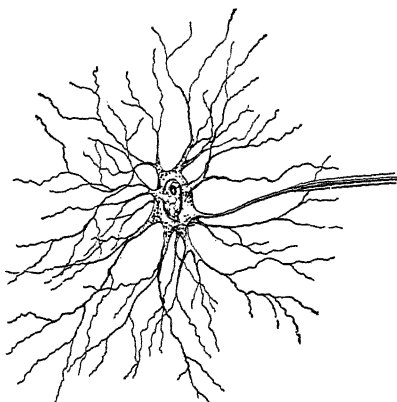


Fig. 35.—Example of a nerve cell of which nervous tissue consists. (P. G. Stiles, "Nervous System and Its Conservation.") The long cytoplasmic strands make contact with other nerve cells or gland or muscle cells which effect a response.

If one could see further into the organization of the cell, the apparent static fixity of the living material or protoplasm would not exist. The chemical materials of which the cel-

lular parts consist are very diverse and constantly reacting and changing during life. This constant change (but within such strict limits, that the organized structure is not broken down) is the distinguishing difference between the living and the nonliving body. These chemical and physical changes are the true functioning of the body. The apparent action of a set of parts, *e. g.*, the digestive system or nervous system, is the composite action of all the units of which it is composed. This helps to make clear the point that structure and functioning are inseparable in life and that the cells are the living units from the time of conception of the individual until his death. The sorts of processes which the cells can perform depend upon the nature of the materials present and the way in which these materials are arranged. Living cellular units which through development produce a new individual also transmit materials from generation to generation. There is evidence of many sorts that actual physical continuity has existed for untold generations and that during this process of descent with modifications there has been established a type of organism which, with all its minor variations, we recognize as human. Most of man's essential features, *e. g.*, (1) his cellular organization, (2) the sorts and general arrangement of parts for the performance of all his functions, (3) his mammalian characteristics—hair, warm-bloodedness, milk for the young, were established before man as an animal type came into existence. His divergences from other types are much less numerous than his similarities to them. They are less differences of kind than of degree. Hence in studying the development of a member of the human species, one is studying sorts of structures and processes which have a much wider occurrence and which have arisen through a very long period in the history of organisms.

LIFE CYCLE

The Life Cycle.—Life for any organism is impossible without parents, because from these parents come the original materials from which the individual develops. These materials are the highly organized protoplasm of the original cells. To these materials must be added chemicals from external

sources at whose expense this original and the subsequent cellular units grow. The increase in the number of cells and in the number of kinds of cells and the elaboration of their arrangement result in a new little individual somewhat resembling the parents. This early embryonic stage is followed by one marked by rapid growth and completion of formation of most of the parts characteristic of the species. The birth of the individual is an episode in life marked by a change from a rather constant internal to a more diverse external environment. The changes of infancy and childhood are similar in kind to those of the latter part of embryonic development but they proceed at a much slower rate. The end of childhood is marked by the forming of specialized germ cells—the last sort of cell to become differentiated. The functioning of all the systems including the reproductive is characteristic of the period of maturity. The loss of the reproductive function and progressive changes in other systems characterize the period of senility until natural death. Only during the mature phase of the life cycle can a new life arise. The new cycle can arise only from material of the adult individuals and this material must be organized in cellular form because it is the pattern of this organization which determines the course of development. The manner of elaboration of these materials results in structures of such character that we recognize the new individual as of the same sort as his progenitors no matter how numerous may be the minor differences.

The Mechanism of Transmission of Materials.—To follow the history of the cells of a body from its earliest beginnings, through development to maturity and through processes of specialization of the germ cells for giving rise to a new generation reveals that there are certain regularly occurring cellular processes. Chief among these processes are: (1) Fertilization, (2) multiplication of cells, (3) differentiation of body cells, (4) growth, (5) differentiation of germ cells.

FERTILIZATION

What Fertilization Is.—Fertilization is the process of formation of a fertilized egg (zygote) from which all the cells of an

individual's body are produced. The formation of this cell is accomplished by the union of two specialized cells, one relatively large (0.2 mm. in man) and nonmotile, the egg cell, the other minute (0.05 mm. in man) and motile, the spermatozoan. As in all terrestrial animals the eggs are fertilized internally so that the sperm cells may not be destroyed by exposure to the air. As is characteristic of types in which the development of the embryo is internal, very few eggs are produced—usually in the human species one egg per month. The

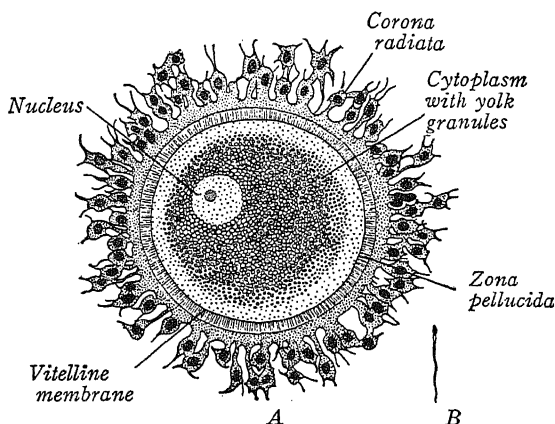


Fig. 36.—A, Human ovum, approaching maturity, examined fresh in the liquor folliculi (Waldeyer). $\times 200$. The zona pellucida appears as a clear girdle surrounded by the cells of the corona radiata. Yolk granules in the cytoplasm enclose the nucleus and nucleolus. B, A human spermatozoon correspondingly enlarged. (After Waldeyer, from Arey, "Developmental Anatomy.")

sperm cells are much more numerous, as many as 200,000,000 minute cells moving about freely in the 3 cc. of seminal fluid which may be transferred from the passageways of the reproductive system of the male to those of the female. The union of the germ cells usually takes place in the upper portion of the oviduct (Fallopian tube) thus establishing in its earliest form a new individual.

The Parents' Contribution to the Fertile Egg.—The egg cell has within it the entire set of character determiners which

are requisite for the establishment of a new individual. In many species the egg cell alone can give rise to the new being. In most cases, however, there is the addition of another germ cell. This union introduces a second entire series of character determiners. The expression in the new animal of the two parental strands is a feature of development which has resulted in wide variability and has probably been influential

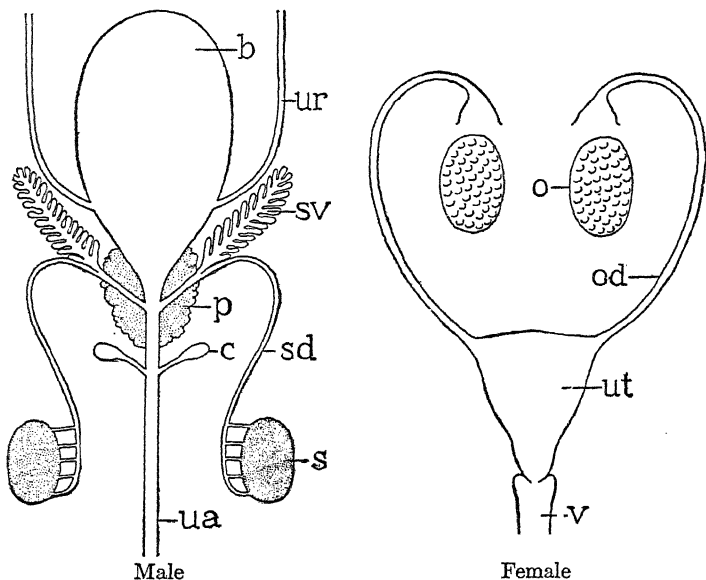


Fig. 37.—Diagrams of reproductive organs of man. *s*, Spermary (testis); *sd*, sperm duct; *sv*, seminal vesicle; *ur*, ureter; *b*, urinary bladder; *ua*, urethra; *p*, prostate gland; *c*, Cowper's gland; *o*, ovary; *od*, oviduct; *ut*, uterus; *v*, vagina. (Plunkett, "Outlines of Modern Biology," Henry Holt and Co., Publishers.)

in the survival of the species under diverse environmental conditions. Thus the specialization of germ cells is not essentially reproductive in its function but is more significant for its effect on variability.

These specialized cells which unite are all that the parents really contribute to the new being and hence must contain the materials which are significant in determining the funda-

mental similarities between the two generations. Since only the nuclear head (and not the cytoplasmic tail) of the sperm cell enters and fuses with the egg nucleus it must be this part which contains the significant materials. Since the maternal influence is, on the average, no greater than the paternal it is probable that the nuclear part of the egg cell also was the only part primarily important in determination of

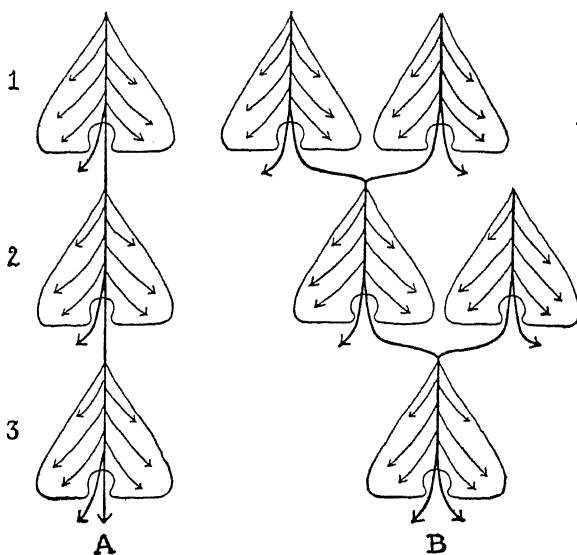


Fig. 38.—Diagrams illustrating the relation between germ and body material: A, In asexual reproduction; B, in biparental sexual reproduction. 1, 2, 3, Successive generations. Heavy lines represent the germ plasma, light lines the soma produced by it in each generation. (Plunkett, "Outlines of Modern Biology," Henry Holt and Co., Publishers.)

the new individual. From one point of view one might consider the egg and the sperm as half cells since each contributes equally to the content of the single cell from which the new individual starts. We shall see later that these specialized germ cells actually do have only half the usual chromatin material in their nuclei.

What Fertilization Accomplishes.—The fertilization process not only stimulates growth but restores to a single cell the

full nuclear content, two whole sets of character determiners (one whole set coming from each of the parents). This fact plays a large part in determining the wide variation which exists among the individuals of any sexually reproducing species. The entrance of a sperm nucleus into an egg cell alters markedly and at once the physiological processes within that cell. One of the usual visible effects of this alteration is the formation of a fertilization membrane on the outside of the cell which prevents the entrance of other spermatozoa. Therefore, not more than two germ cells contribute materials to the fertilized egg. The stimulated egg cell grows and soon undergoes division into two cells.

MULTIPLICATION OF BODY CELLS

What Mitotic Cell Division Accomplishes.—This process of division is the one by which all the cellular units of the body are produced. Cells never arise except by the division of some preexisting cell. The old cell contributes to the new by a very accurate process of division not only a quantity of material but a very definite pattern of organization of this material. There are several significant things accomplished by the mitotic process: (1) The size of the protoplasmic units is kept small. Since many of the essential processes in physiology are dependent upon intake and elimination of materials by the cells there is more surface for these exchanges if the units are of small size. (2) During the division process the mingling of the nuclear and cytoplasmic materials of the cell (which are at other times kept separate by a membrane) facilitates many of the chemical reactions important to the functioning of the cells. (3) The distribution of the nuclear materials to the two cells is such that these new nuclei are identical with each other and with the nucleus from which they came. The mechanism for accomplishing the exactly equal distribution of this nuclear material is so exact in its operation that all the cells of the entire body have nuclei which are alike in their materials. The importance of this lies in the fact that the chromatin materials of the nuclei are the essential chemicals (genes) regulating the functioning of cells, thus bringing about the harmony in developing and functioning which regularly occur in a normal multicellular body.

The Mitotic Process.—To understand how this even distribution is accomplished one must consider further the structure of the nucleus of a cell. The rather dense material of this part, the chromatin, so called because it takes stains so readily, appears arranged as scattered granules within the nuclear area and enclosed by a membrane. A liquid nuclear sap fills the intervening spaces. The first sign of approaching division is a rearrangement of the chromatin particles. They

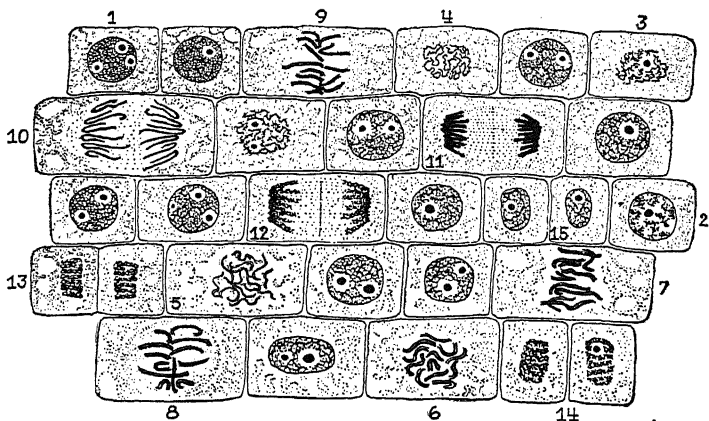


Fig. 39.—Portion of section of root-tip of onion, fixed and stained. 1, Cell in growth or "resting" stage; 2-14, successive stages of cell division; 15, cells shortly after completion of cell division. (Plunkett, "Outlines of Modern Biology," Henry Holt and Co., Publishers.)

Though this figure is made from plant material, the process is essentially similar in plants and animals. Cytoplasmic constriction toward the end of the process does not appear the same in both cases because a nonliving wall is being formed between the two new cells in the plant and not in the animal.

come to lie in a linear series which appears as a twisted strand, the spireme. The nuclear membrane has gradually disappeared and allowed to mingle with the cytoplasm whatever chemicals of nuclear origin were enclosed. The spireme breaks crosswise into a number of short lengths, strands of chromatin granules, called chromosomes. Chromosomes are temporary arrangements during cell division of chromatin granules which are present in all cells at all times. These

rod-shaped bodies arrange themselves across the center of the cell in a formation resembling a plate. Each chromosome then splits in half lengthwise so that after the process of splitting there are twice as many in the cell and in duplicate pairs. Since the original chromatin granules were arranged in a single linear series at the time of chromosome formation, this process of splitting has divided each granule of

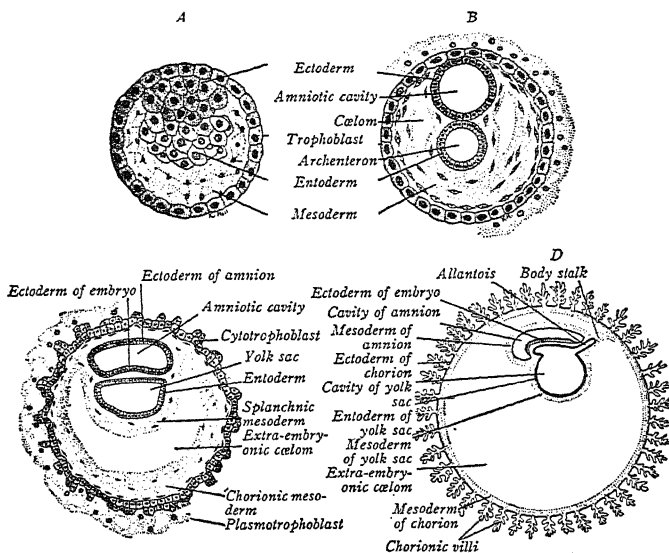


Fig. 40.—Diagrams of early human embryos (adapted by Prentiss). These diagrams based on observations of certain rare recorded early, human embryos. (Arey, "Developmental Anatomy.")

each chromosome so that there are now present in the cell two complete sets of granules where formerly one had been. The members of each pair then draw away from each other and migrate to opposite ends of the cell. There is thus accumulated at each end a group of chromosomes. Those of the two ends are alike in quality and quantity of material because they have come by equal division and distribution of the original chromosomes. They then become recon-

structed as nondividing nuclei in which the chromatin appears again as scattered granules and the cytoplasm be-

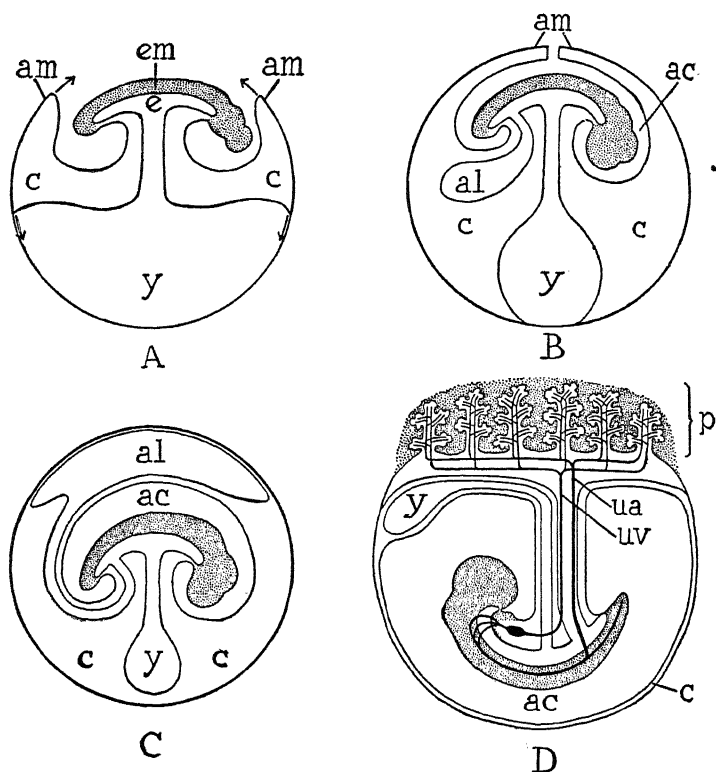


Fig. 41.—Diagrams showing development of the embryonic membranes and the placenta. A, Amnion growing out around the embryo; B, Amnion about to close, allantois growing out in the extra-embryonic coelom; C, amnion complete, allantois fusing with outer wall of the extra-embryonic coelom; D, placenta fully developed. *em*, Embryo; *e*, enteron; *y*, yolk sac; *am*, amnion; *c*, extra-embryonic coelom; *ac*, amniotic cavity; *al*, allantois; *ua*, umbilical artery; *uv*, umbilical vein; *p*, placenta, its maternal portion shaded (maternal blood vessels not shown), embryonic portion unshaded with embryonic blood vessels indicated. (Plunkett, "Outlines of Modern Biology," Henry Holt and Co., Publishers.)

tween the new nuclei is constricted, completing the formation of two small cellular units where one larger one formerly

had been. This process is going on in thousands of cells of the body all during life. The mitotic rate is greatest during embryonic life. This process in which chromosomes are formed and divided equally and distributed equally to the two new cells is called mitotic cell division or mitosis. The significance of equality of chromatin material becomes more apparent as development proceeds.

Establishment and Implantation of the Embryo.—The process of developing (or revealing the potentialities of) a new

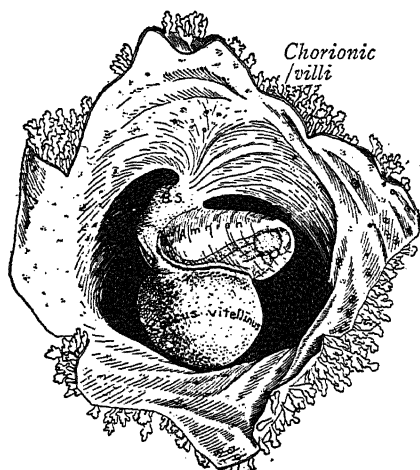


Fig. 42.—Chorionic sac opened to display a human 2.15 mm. embryo *in situ*. $\times 6$. (Corning, after Coste). B.S., Body stalk.

organism requires other processes than just increase in number of cellular units by mitotic division. The group of cells, after the very earliest stages does not remain a spherical mass of identical units. Differences in rate of growth bring about a visible difference between the more rapidly growing outer layer (the trophoblast) and the inner cell mass from which the parts of the individual come. The very early embryological stages have not been observed in man but the corresponding ones have been observed in other mammalian types.

After implantation, the inner cell mass differentiates into three layers of cells which give rise in regular fashion to all the parts of the body. Since an organ cannot be traced back to any particular cell in an early embryo but only to some one of the three early layers these have been called "germ" layers because they give rise to parts. The essential similar-

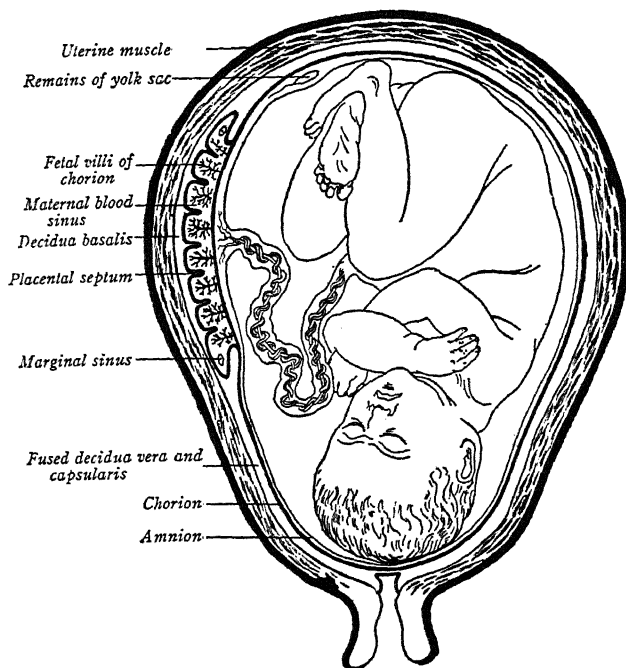


Fig. 44.—Diagrammatic section of the uterus illustrating the relation of an advanced fetus to the placenta and other membranes. (Ahlfeld.)

ity of process in originating parts of different animals, *e. g.*, fish, amphibian, bird, rabbit, and man (Fig. 45) indicates a fundamental similarity in the organization of their nuclear materials, since it is this material primarily that determines what sorts of reactions will occur and hence what sort of structure will be produced.

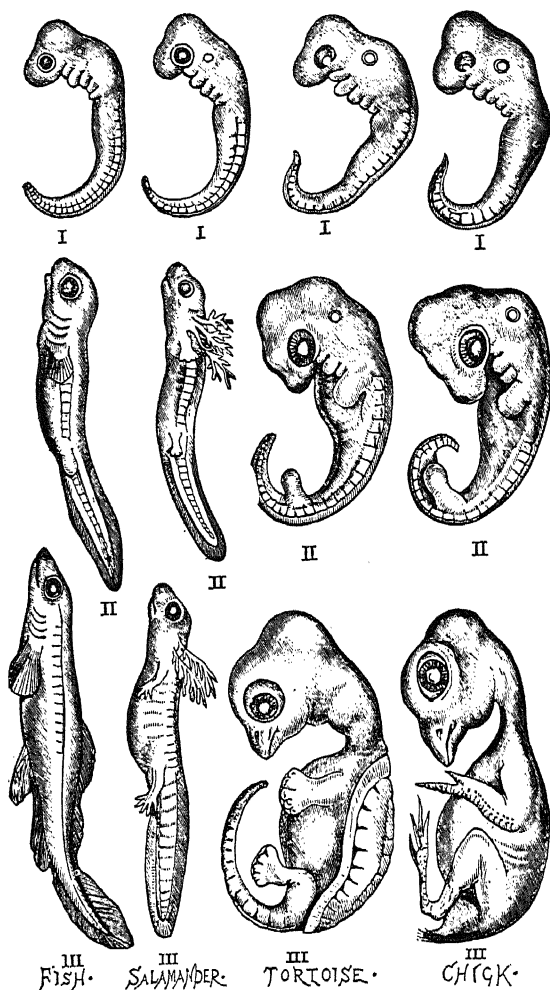
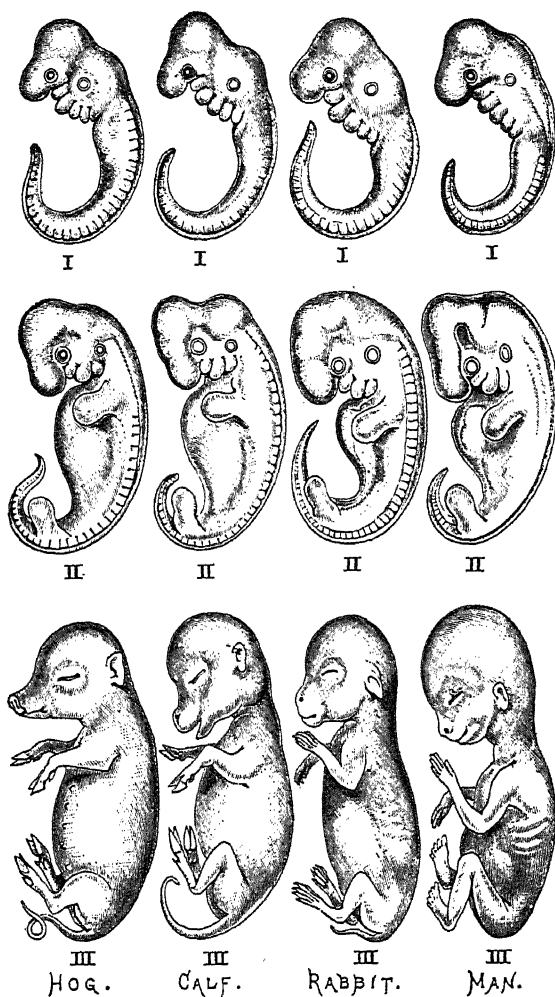


Fig. 45.—Different vertebrate animals in successive embryonic stages. I, First or earliest of the stages figured. II, Second of the stages. III, Third or latest of the stages. (After Haeckel.)



The illustrations from top to bottom of the page in each column show successive stages in the development of the same sort of animal.

ORIGIN OF THE ORGANS OF THE BODY

The forming of parts is accomplished largely by unequal growth which results in the folding in or out of portions of layers of cells, *e. g.*, the pushing out from the ventral side of the digestive tract of a mass of cells which becomes the liver or the pushing in of a group of cells of the skin opposite the retina which becomes the lens of the eye. These bendings and cuttings off of masses of cells account largely for the relative positions of the organs but not for the variety of their cells. A further process, differentiation, modifies the cytoplasmic parts of cells in local areas so that the resulting units appear very different from one another though their nuclei are identical because mitotically produced. It is because of these cytoplasmic differences that gland cells behave differently from muscle cells and nerve cells perform functions which bone cannot do. The causes for the particular location and time of change in growth rate and for the cytoplasmic differentiations in various regions of the embryo is one of the most challenging fields of investigation (experimental embryology).

The establishment of parts of the body is thus largely the result of multiplication, unequal growth and differentiation of cells. From the outer layer (ectoderm) the epidermis of the skin is produced and certain parts formed from it like sensory cells, hair, nails, skin glands and parts of the teeth. The entire nervous system (which is primarily concerned with coordination of activities in relation to changing external conditions) is specialized also from this original outer layer. From the innermost layer (the endoderm) comes the lining of the entire digestive tract and such parts as arise by out-pushings of this tract, *e. g.*, eustachian tubes, trachea, bronchi, lungs, liver and pancreas. From the middle layer (mesoderm), with much differentiation come the parts used primarily for support, movement, circulation and excretion. These are represented by the dermis, or inner skin layer, the muscles, the skeleton, the circulatory, excretory, and reproductive organs.

The normal development of the individual entails a long series of changes in form of parts which are largely the result of local inequalities of growth. The inherent materials

of the cells (the genes from the parents) and the conditions under which the developing individual exists are both operative in determining the nature of the new individual. To have had different parents or to have used different germ cells from the same parents would have produced a different result. Also to have altered markedly any of the major environmental factors like temperature, pressure, amount of oxygen, amount or character of food substances would have produced a different result. Since the egg of a human being can develop only into another organism of the same species, if it develops at all, we can fairly say that the inherent materials determine what sort of an organism will arise. The production of another individual of such intricate organization as a human being implies close regulation of a great number of chemical and physical processes. Experimental evidence from various sorts of organisms indicates that: "The visible processes of development are the results of various chemical reactions among the components of the cells and the food substances derived directly or indirectly from the external environment. These reactions are determined largely by specific catalysts or enzymes produced in the cells. These catalysts are produced directly or indirectly by the genes acting upon the various components of the cytoplasm."* Because the genes of parent and offspring are essentially similar they produce individuals whose structure and functioning are similar—often to great minuteness in degree of resemblance of certain details, *e. g.*, proportion of facial features, gait, tone of voice, with all that these imply structurally and physiologically.

After primary establishment of the body from the germ layers there are great changes in proportion of parts as well as changes in size and weight. The exact age of a human embryo cannot be determined because of uncertainty regarding the relations between times of discharge of an egg from the ovary, copulation, and fertilization. Analysis of changes in body length and weight with increasing age shows that the greatest percentages of increase are in the early stages.

* Plunkett, Charles Robert, "Outlines of Modern Biology," p. 556, 1929, Henry Holt and Co., Publishers.

Age of embryo.	Crown-rump length (mm.).	Crown-heel length (mm.).	Chorionic sac (mm.).	Weight in Gm.	Ratio of increase to weight at beginning of month.
Two weeks.....	0.1*	0.1*	1 x 0.5	0.004	8000.00
Three weeks.....	1.5*	1.5*	5 x 4		
Four weeks.....	2.5	2.5	14 x 9		
Five weeks.....	5.5	5.5	24 x 17		
Six weeks.....	11.0	11.0	34 x 29		
Seven weeks.....	17.0	19.0	42 x 36		
Second lunar month..	25.0	30.0	52 x 44	2	499.00
Third lunar month....	68.0	98.0	.....	24	11.00
Fourth lunar month..	121.0	180.0	.....	120	4.00
Fifth lunar month....	167.0	250.0	.....	330	1.75
Sixth lunar month....	210.0	315.0	.....	600	0.82
Seventh lunar month..	245.0	370.0	.....	1000	0.67
Eighth lunar month...	284.0	425.0	.....	1600	0.60
Ninth lunar month...	316.0	470.0	.....	2400	0.50
Full term (268 days)..	336.0	500.0	.....	3200	0.33

Total length of embryonic disk. Arey, L. B., "Developmental Anatomy," Second Edition, 1931.

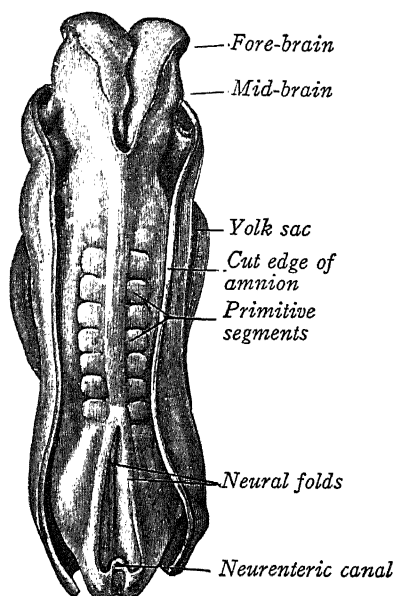


Fig. 46.—Human embryo of 2.1 mm. with nine somites, viewed from above. (Eternod.) $\times 35$.

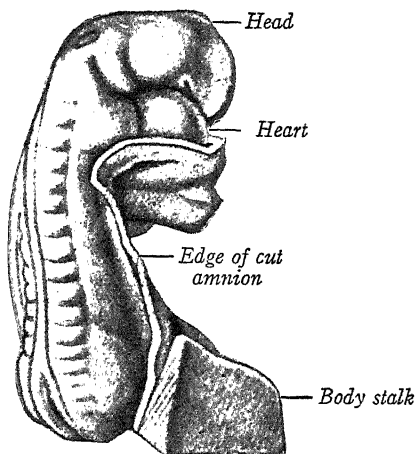


Fig. 47.—Human embryo (Pfannenstiel) of 2.6 mm. with fourteen somites (body segments), viewed from the right side (after Keibel and Elze). $\times 22$. In this and all later specimens the head is bent.

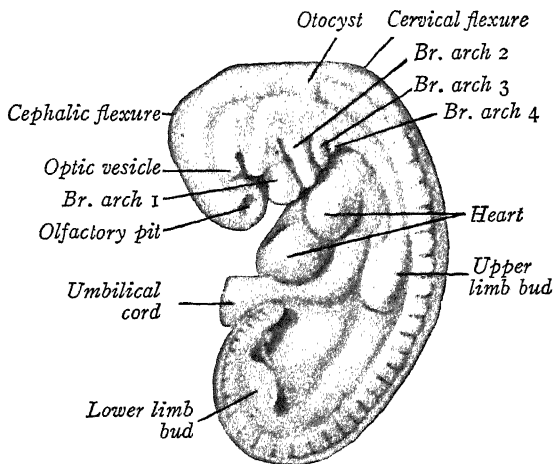


Fig. 48.—Human embryo of 5 mm., viewed from the left side (after His). $\times 10$.

Embryos a month old are cylindrical in form, and have their extra-embryonic membranes well established. The neural folds along the back are beginning to form a tube which will become the brain and spinal cord.

Embryos two months old are beginning to have an indication of the later body form. The outlines of head, face, chief sense organs, limb buds, and segmental muscles of the back are visible. The ventral body wall is less flat due to the more rapid increase in size of heart, liver, and intestine when compared with the body wall.

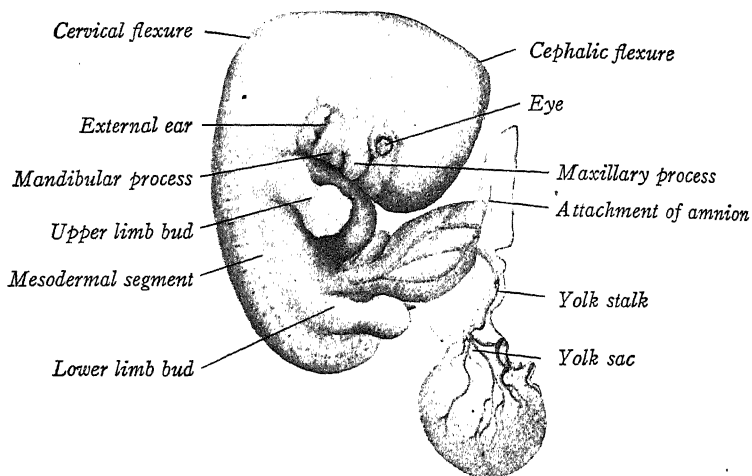


Fig. 49.—Human embryo of 12 mm., viewed from the right side (Prentiss).
 $\times 4$.

At three months the embryo resembles a miniature individual but with the head disproportionately large. During the rest of embryonic life the chief changes are in the actual and relative size of parts already established. For this reason the period from fertilization of the ovum until birth is often divided into an "embryonic" period of about three months in which parts are being laid down and a later "fetal" period marked chiefly by growth. As with all classifications this is somewhat arbitrary since there is nowhere sharp demarcation between periods.

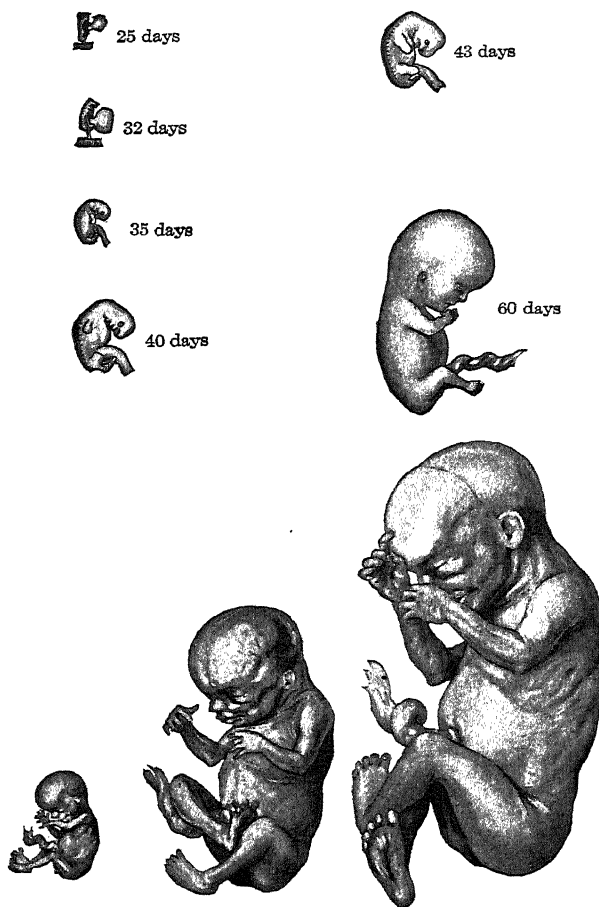


Fig. 50.—Human embryos of three weeks to two months (His), and fetuses of two, three and four months. Embryos natural size, fetuses three-fifths natural size. (DeLee.)

POSTEMBRYONIC DEVELOPMENT

The increases in number of cells and tissue specializations continue in postembryonic life and occasion the observable changes which accompany the child's development into an

adult. The individual increases in size with varying rates of growth in the different tissues until there is relatively little further change. Parallel with this physical development is the psychological development, the early phases of which are chiefly concerned with becoming aware of the things in environment and the later phases of which are characterized by becoming aware of the more intricate relationships between persons and things. This is such a continuous unfoldment that the relative overemphasis which is often placed upon adolescence is misleading. The normally occurring sequence of phases is not closely related to chronological age but to the physiological rate at which the developmental processes proceed, a fact which is

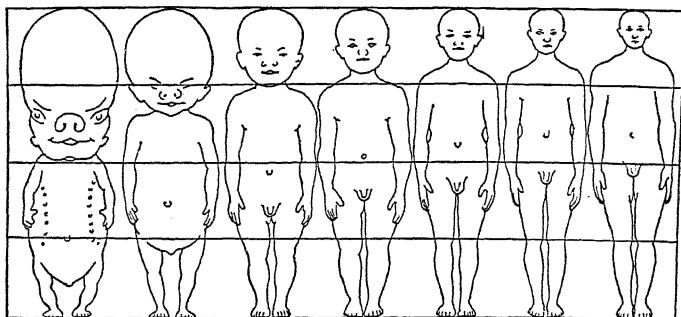


Fig. 51.—Diagrams to illustrate the changing proportions of the body during prenatal and postnatal growth. (Scammon, after Stratz.)

of great importance in the interpretation of growth and behavior. With the greater speed of development at one period there may be retardation of changes at a subsequent period. Children maturing early are not necessarily going to develop farther than those who reach the same degree of maturity less rapidly. For this reason, averages with children are more fictitious than with adults. Divergence from the average may be but a difference in phase which will diminish as adulthood is approached. Also, since there is no uniformity in physical or mental status of adults, there are marked differences in the time of slackening of developmental change.

The expression of the inherent pattern in the materials

available and under changing conditions characterizes living. The experiences of one period are possible because of the preceding history of the organism and they in turn help to determine what subsequently can occur. Throughout the entire life cycle the toleration of diversity of condition is quite wide. Whereas certain environmental relationships make for the optimum expression of the individual's nature, the margin of safety is so wide that even quite broad deviations from the usual materials and activities do not show appreciable effect—a fact about the nature of life which might well be understood by the overconscientious parent. One of the most interesting things about life is its durability achieved through organization and constant flux of materials from whose description one could not predict the characteristics of the living.

Maturation of Germ Cells.—During the latter part of the growth period and during the years of maturity the individual is normally capable of producing functional germ cells which may take part in the formation of an individual of a new generation. This process of formation of specialized germ cells is the last type of cellular differentiation to occur. Because of the great importance of this process in causing the similarities and differences among children of the same parents, it is worth careful consideration.

The numerous cells in either sex which are later to become the eggs or sperms have been left undifferentiated in the ovaries or testes all during the early life of the individual. At regular intervals during adult life one or a few of these cells go through the process of maturation. A number of significant things occur during this process. When a potential germ cell is about to undergo maturation: (1) It increases markedly in size, (2) chromosomes are formed, and (3) these move about in the nuclear area until they lie side by side in pairs. In this synaptic pairing the complete sets of determiners from the two parents are so arranged that the corresponding genes from each set lie side by side. During the maturation process cell division occurs twice, only one of these is a typical mitotic division. The other is a "reduction" division in which the chromosomes do not split but the two members of a synaptic pair separate and move toward op-

DIAGRAMMATIC REPRESENTATION OF MATURATION OF THE MALE GERM CELL IN A SPECIES WITH FOUR CHROMOSOMES

(Those of similar form are synaptic pairs. Those similar in shading are of the same origin—maternal or paternal)

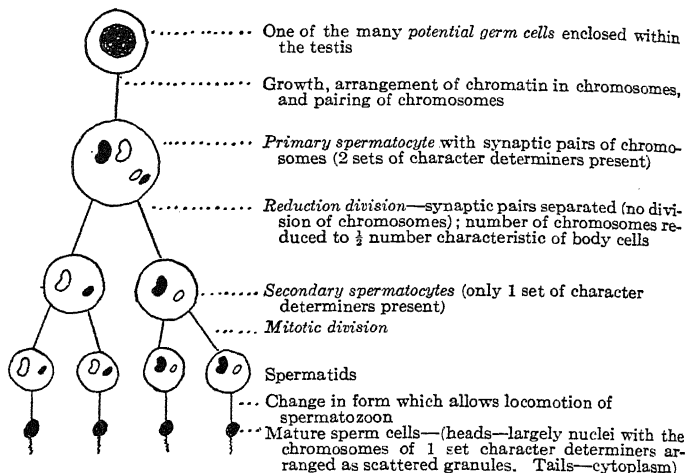


Fig. 52.—At the reduction division the segregation of chromosomes of the synaptic pairs might have chanced to occur in such a way that the secondary spermatocytes and subsequent cells could have been represented as follows:

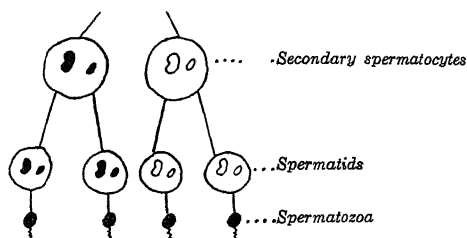


Fig. 53.—The sperms thus produced would be of two kinds but would differ in chromosomes qualitatively from the two kinds produced by the other possible segregation shown above.

posite ends of the cell. This movement of chromosomes is followed by the usual constriction of the cytoplasm. When a reduction division occurs one cell divides into two which are not like it in either quantity or quality of chromatin ma-

DIAGRAMMATIC REPRESENTATION OF MATURATION OF FEMALE GERM CELL

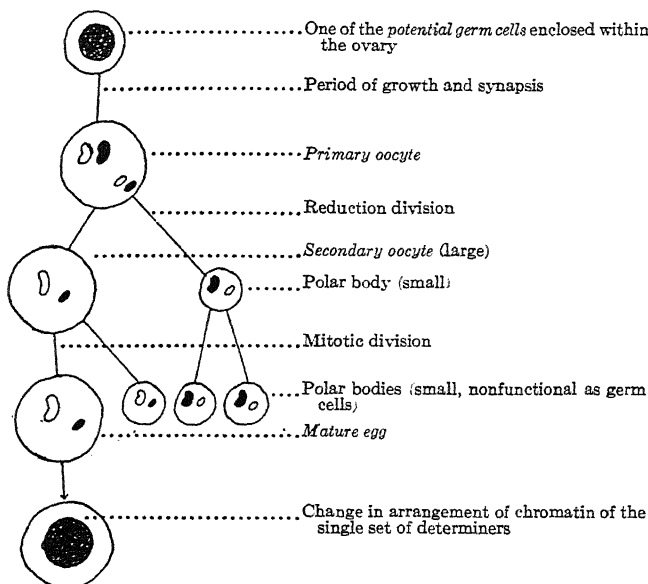


Fig. 54.—Reduction might have taken place so that the secondary oocyte and mature egg would have had a different chromosome combination, *e. g.*

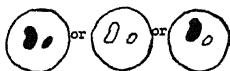


Fig. 55.—Since in this hypothetical case of a species with four chromosomes, four different sorts of sperms and four different sorts of eggs could be produced during the normal operation of the maturation process, sixteen possible combinations could be made for these sorts of germ cells at the time of fertilization.

In man with his forty-eight chromosomes the number of sorts of ways in which segregation might occur is proportionately increased and hence also the number of possible germ cell combinations at fertilization. The number of possible combinations of character determiners is still further multiplied because there is often an exchange of parts between the chromosomes of a synaptic pair.

terial. Typically each of these cells has just half as many chromosomes as the original. Only one whole set of character determiners is present in each instead of the two which every cell derived from a fertilized egg by mitosis has. Since

the two sets of genes before reduction differ in quality (because they originally came from two parents) the reduced cells are not alike. Thus it is usual to have from the same parent germ cells which are dissimilar. For this reason all the children of the same parents except identical twins (which are both derived from the same fertilized egg) are slightly dissimilar genetically—a fact of much importance in understanding the diversities existing among members of a family.

The chief difference in the maturation of male and female germ cells is in the cytoplasmic division. In the male four functional cells of equal size are formed; in the female the division of cytoplasm is unequal, leaving most of the cytoplasm in but one potentially functioning cell. The independent assortment of the chromosomes during the reduction division and their random recombination during fertilization makes it inevitable that parents will produce children who do not resemble them or each other in all ways.

Detailed study of: (1) Cellular processes (*i. e.*, cell division and specialization of germ cells and fertilization) and (2) breeding experiments have shown an association between the characteristics observable in an individual and his nuclear material or genes (so-called because they give rise to features). On the bases of these studies one concludes that: (1) Genes must be transmitted in reproduction; (2) they must be stable and self-perpetuating; (3) they must be of double origin in every cell since a complete set of determiners comes from each parent; (4) they must be separable particles linearly arranged in the chromosomes. Experimental evidence on other animals indicates that the effect of the genes upon the individual may be produced before or at fertilization, in early or late embryogeny, in childhood or adult life. Probably all parts are affected by every gene so that the structural features, both internal and external, and the physiological (including the psychological) are largely a resultant of the processes controlled by the relative actions of the two genes of every pair in every cell. Because man and the other animals are similar in the (1) processes of distribution of genes and (2) structure and functioning, the relation of genes and characteristics is thought to be the same

in him as in the organisms where it has been experimentally demonstrated.

The knowledge of the transmission of characteristics from generation to generation in man is very limited. This is necessarily true because the nature of man prevents his being willing to use his own kind for experimental breeding to discover the factors. Even if he could be so used it would take untold numbers of generations to work out the distribution of determiners in a species with 48 chromosomes. This is how it has come about that so little is known about human inheritance and that this little is largely about strikingly abnormal conditions whose recurrence has been noticed.

Questions Arising Regarding Development.—The questions most frequently asked by the lay person concerning inherited characteristics are: What physical traits do children inherit? Why do brown-eyed parents have blue-eyed children? Does the height of the parent determine the height of the children? Do we inherit disease? Do certain diseases tend to “run in certain families”? Are personality characteristics and “special aptitudes” such as musical talent, mechanical skill and artistic ability passed from generation to generation? Can children be marked by experiences of the parent during pregnancy? Can parents make artists or musicians of their children by cultivating their own appreciation of art or music? Can you make a desired germinal combination between two parents?

Physical Traits.—The evidence now available shows that the color of the hair, the form of the hair (curly or straight), the pigmentation of the skin, color of the eyes and the form of the features are characteristics, the manner of whose inheritance has, at least, been partially demonstrated.

Does the Height of the Parent Determine the Height of the Children?—There seems to be no doubt that inheritance may set certain limits for stature which the normal individual will not exceed but that within these limits there is considerable range in height attained due to the influence of a variety of physiological and nutritional conditions.

Boas has made a study of the children of immigrants in New York City which, according to Stockard, furnishes most

important data on the environmental modification of types. Central continentals from Europe of short stocky type when bred in a maritime environment for several generations tend to become of the tall slender type. Stockard says, "... the gland quality that produces the type is certainly inherited but the action of the gland itself is actually modified by environment." In this case the apparent characters of the individuals differ in the two environments though their hereditary nature is unchanged.

McCollum discusses the effect of difference in food supply upon Japanese children born in America as compared to those born in Japan. Those born in America, both boys and girls, are larger at all ages than are Japanese children born and reared in Japan. Without doubt it is the superior food which they have received that has made them outgrow their relatives across the Pacific.

Evidence from Animal Experiments Regarding Increase in Size.—Deficiency in quantity and quality of protein, deficiency of minerals such as calcium and phosphorus have been shown to affect appreciably the optimum growth in stature from generation to generation in experimental animals. It is clear that such constitutional changes are not due to inherent changes in the genes but to an alteration in the environment. Even a slight unbalance of equilibrium in the tissue fluids bathing the body cells may alter the development of the individual.

Recent nutritional research on laboratory animals would confirm the importance of protein, minerals and vitamins as determining factors of *body height*. The early experiments of Osborne and Mendel have illustrated the striking differences in the value of proteins from different sources for the support of growth. They also found that animals remained stunted for long periods when the protein content of the diet was limited in amount. However, they found that interruption of growth does not result in the loss of capacity of the young to grow and when the amount of protein in their diet was increased the rats resumed growth at a "normal" rate and produced progeny whose development indicated that genetic content had not been changed.

More recent investigations undertaken by Osborne and Mendel as well as Mendel and Cannon have strikingly brought to light the fact that the albino rat has shown more rapid rate of growth than that standardized by Donaldson in 1912. This has been attributed as "not due to selection or marked changes produced in the stock through breeding, but primarily the result of a more appropriate diet than had hitherto been employed in the experimental feeding of rats." In other words, according to Mendel and Cannon, "the inherent capacity for the rat to grow has in the past rarely been given full play in the laboratory."

The question is often raised whether *size* is not entirely a racial characteristic and inherited rather than determined by such agencies as nutrition. Some very good evidence on this point McCollum found in the history of his experimental rats. When the nutrition of these animals fell just below a certain standard, there was no easily observable sign of malnutrition. Their appearance and fertility remained such that they could be judged to be "normal," yet the size diminished from generation to generation. The inferiority of successive generations, he thinks, may be the result of injury during the nursing period or due to confining the young after weaning to the same inferior diet as that of the parents.

Is Disease Inherited?—Jennings* has admirably presented the evidence regarding the inheritance of disease in his "Biological Basis of Human Nature," as follows:

"Many peculiarities of human individuals are the result of a particular kind of environment acting upon a particular type of gene; . . . This is particularly true for diseases, for pathological conditions of various kinds. On these matters there has been much misunderstanding, in consequence of the common fallacy that if a characteristic is affected by the environment it cannot be hereditary; that if it is hereditary, it cannot be influenced by the environment; in other words, that characteristics fall into two mutually exclusive groups in respect to these matters. Most diseases are greatly influenced by the conditions of life; yet most or all of them

* Jennings, H. S., "Biological Basis of Human Nature," pp. 147-149, 1930, W. W. Norton & Co., Inc., Publishers.

are likewise influenced by the nature of the individual's genetic constitution. For the occurrence of tuberculosis, infection with the tubercle bacillus is required; and this is not a matter of genes, of heredity. But some combinations of genes yield a much better culture medium for the tubercle bacillus than do others. A person that has such a gene combination is much more likely to develop tuberculosis than another whose genes do not yield a good culture medium for the bacillus. An 'hereditary' element is therefore involved. Yet the individual whose genes produce a body that is prone to tuberculosis need not develop the disease if he takes measures to prevent the bacillus from getting a foothold in his body. Doubtless there are many different types and grades of individuals with respect to this matter. Some offer a particularly favorable ground for the growth of the tubercle bacillus; others a less favorable ground, and so on through a series of grades, till we reach individuals that are almost or quite immune to attacks of the disease. The genetic constitution is therefore of much importance in connection with tuberculosis. Yet the environment is probably even more important. It is entirely conceivable that by the discovery of measures effective in preventing the transmission and development of the bacillus, tuberculosis could be brought to disappear; so that genetic differences in susceptibility to it would be of no farther consequence.

"Similarly, some combinations of genes yield bodies that are much more prone than others to break out into that unregulated growth that is called cancer. In rats and mice, under the usual conditions of existence, individuals having certain sets of genes almost invariably develop cancer, while those with other genes do not. In other strains, with another set of genes, about half the individuals develop cancer; in still other strains, none. These differences are inherited in Mendelian fashion, showing that they are due to differences in one or two genes.

"There are in these animals strains in which a bit of grafted cancer tissue regularly develops into a cancer; others in which this almost never occurs. There are strains that are particularly susceptible to one kind of cancer, not to an-

other. Many grades and qualities of susceptibility exist, up to that of individuals derived from such combinations of genes that they almost never develop cancer.

"It is probable that in man there are similar diversities in susceptibility to cancer, resulting from the different genes of different individuals. There is, however, no indication that there exist in man strains having the extreme susceptibility to cancer shown by certain races of mice. These extremely susceptible races of mice are isolated and multiplied by careful selection and by breeding in such a way as to bring together and preserve the gene combinations that are most susceptible to cancer. This does not occur in man, so that there is no reason to suppose that there are any human beings who are predestined to develop cancer, whatever the conditions. The environmental conditions that play a part in cancer are little known; though it is known for rats and mice that under certain conditions cancer is produced in individuals that under other conditions would not suffer from it. It is conceivable that knowledge and control of the environmental factors for cancer (as for tuberculosis) should progress to such an extent that the genetic factors would, in the case of man, become of little importance.

"A situation that is similar in principle to that sketched for tuberculosis and cancer exists for most, if not all, diseases, infectious or otherwise. Certain environmental conditions are required for the occurrence of the disease; or at least greatly influence it. But under conditions favoring the disease, some combinations of genes yield to it, others do not. It is probable that there is no disease whatever, acute or chronic, infectious or noninfectious, whose occurrence is not influenced by the nature of the individual's genetic constitution. There can be little doubt that, other things being equal, some genetic constitutions are more readily attacked by plague, by smallpox, by typhoid, by pneumonia, than others; just as some combinations of genes yield more readily to extremes of temperature, to exposure to the elements or to unfit food; just as some gene combinations are more likely than others to come off victorious in a struggle with a wild-cat, or to survive a bite from a rattlesnake.

"There is a common impression that a disease or defect that is 'hereditary' is inevitable, inescapable; that it is a fate against which the individual cannot struggle. The matters just discussed illustrate the fact that even though a hereditary or genetic basis exists for a defect or a disease, that defect or disease need not actually come into existence. Heredity, inheritance, has no such absolute significance as that notion implies. What the individual inherits is a constitution that under certain conditions will produce the disease; under others it may not."

Can Children be Marked?—There is a widespread belief among people that unusual circumstances such as a shock, an accident, the sight of blood, being frightened by an animal, *e. g.*, a mouse, may so disturb the mother that it may "mark" the fetus. As stated before the only connection between the mother and the fetus is through the placenta. The blood of the child flows through the blood vessels of the cord to the placenta, then through the inside of the villi. The villi dip into the maternal blood, and since there is no direct connection between the blood of the fetus and that of the mother, the interchange of foods and wastes must occur through membranes of the cells. Since the only path for communication is the indirect one by way of the blood stream, there is no nerve connection between the mother and the child. Mental experiences travel only by way of the nervous system, and can communicate themselves in no other way. Therefore, we are compelled to believe that the whole matter of direct specific influence of the mother's mind upon the developing fetus is a myth. Beliefs that structural changes produced in the unborn child corresponding to some mental experience of the mother, usually a vivid impression or strong emotion, have no scientific basis.

In the face of such physiological facts there seems to be no ground for believing that a mother sitting for hours before a beautiful picture or practicing for hours on a musical instrument can make the unborn child artistic or musical. The inherent characteristics are already present in the genes at fertilization and what the parent may do can *not* alter their character. The environmental conditions in the mother's body

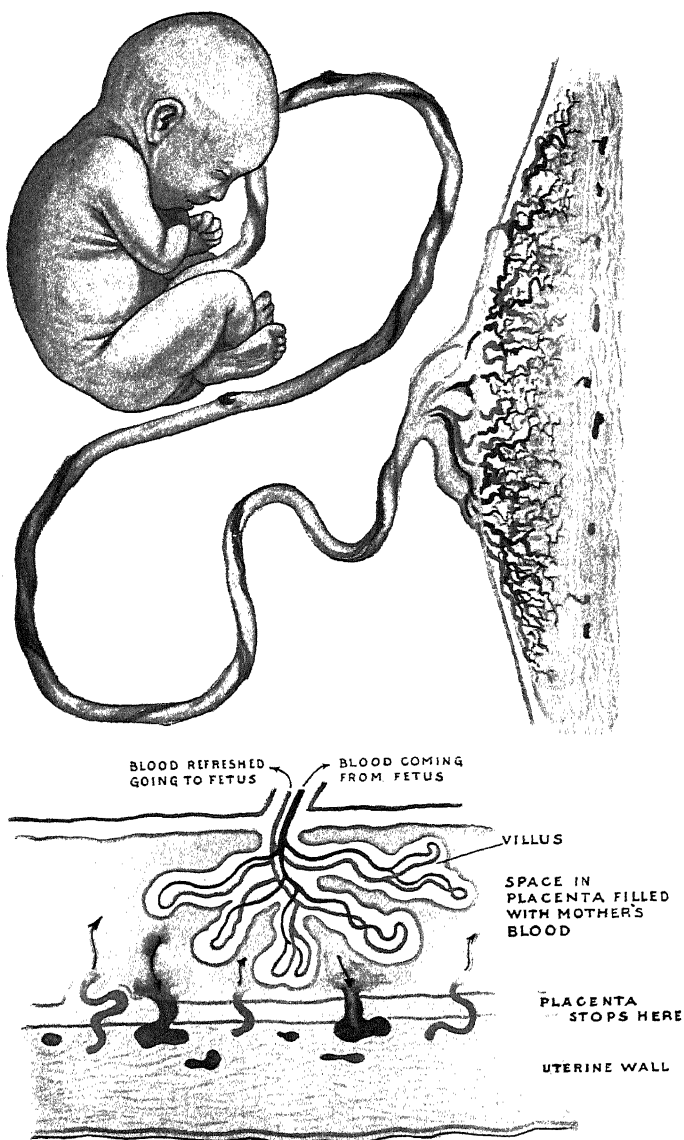


Fig. 56.—Diagrams to show the relations of the maternal and fetal circulations. (From De Lee, *Obstetrics for Nurses*.)

may interfere with the rate of growth or the normal development of the cells but they do not change the inherent nature of the genes so that an individual without musical aptitudes becomes musical or without artistic ability becomes artistic. A mother "wishing" a child may possess a special aptitude does not change the genetic character of his cells. All that a parent can do to make his child show any desired characteristic is to expose him during his postnatal development to the environment which will allow the greatest possible expression of his inherent aptitudes along this line. Each child is an individual, a unique combination of characteristics that has not occurred before, and to try to fit him into a preconceived pattern at variance with his aptitudes is to limit the expression of his potentialities.

Summary.—The aim of this chapter has been to give a brief summary of the biological ideas which are necessary in the formulation of a concept of children as living beings. The emphasis has been upon the intricately related processes which result in the child as we know him. Hence whatever we may learn concerning these processes is the foundation for analysis and judgment of an individual child. The parent or teacher cannot change the child's nature hence it is not his function to attempt to do so. Because of the unspecialized condition of a child at birth, however, his exposure to the social heritage at various ages is an important part in his fulfillment. The parent or teacher through recognition and appreciation of his individuality can supply the sort of environment in which he may express the maximum of his potentialities. If the growing individual comes to have the same point of view, he will not interpret as so catastrophic some of the phases in his own career and will tend to arrive at an objective understanding of himself.

SUGGESTED QUESTIONS

1. What does the process of differentiation accomplish in prenatal development?
2. On the basis of the cellular processes explained in this chapter how can you demonstrate the fallacy of the common belief that "like produce like"?
3. What is the relation between *acquiring* of a disease in man and his genetic constitution?

4. What changes have been made in your concept of your relations to the child by the material in this chapter?

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CHAPTER VIII

PRENATAL CARE OF THE MOTHER AND THE PREPARATION OF THE FAMILY FOR THE BABY

THE IMPORTANCE OF PRENATAL AND OBSTETRICAL CARE

Prevention of Maternal Mortality.—The maternal mortality rate, that is, the number of women dying from causes directly connected with pregnancy or childbirth, compared to 1000 live births, was 6.5 in the U. S. Birth Registration area for the year 1926. Twenty other countries in the world had a better rate than this for that same year, a fact of which the richest country in the world should not be proud, particularly when it is an acknowledged fact that the rate may be lowered if all women have adequate care during pregnancy and childbirth.

A comparison of the maternal mortality rate of an organization like the Maternity Center Association in New York which secures adequate medical and nursing care for women during pregnancy and childbirth with the maternal mortality rate of the city itself gives 2.4 for the M. C. A. and 5.3 for the city at large. In the areas in which the M. C. A. worked "the maternal mortality rate among women who did *not* receive care from the Association was 7.5 per 1000."* In this same bulletin it says: "The lives of two out of every three American women who die each year during pregnancy, in childbirth or shortly after childbirth, could be saved if these women received proper medical and nursing care." The fact of which every man and woman should be aware is that adequate prenatal care and obstetrical care lowers a maternal mortality rate. Women live who otherwise would die. An unduly high rate indicates that women are going without that care.

A study of maternal mortality made by the Children's Bureau, U. S. Department of Labor, and reported in Bureau Publication No. 158, gives puerperal septicemia (infections

*Quoted from Statistical Bulletin, Metropolitan Life Insurance Company, February, 1930.

of the birth canal and uterus) as the most important single cause of maternal deaths. Forty per cent of the maternal deaths in 1921 were due to this one cause and a large percentage of puerperal infections are preventable. The physician who practices the correct technic for surgical asepsis is seldom the physician who loses cases from puerperal or childbed fever, as it is sometimes called. Toxemia (puerperal albuminuria and convulsions) which causes more than 25 per cent of maternal deaths in the United States is a condition which can be detected in its early stages by the physician and which, in most instances, responds to treatment. Undetected and untreated it may cause the death of both mother and baby. If the deaths from these two causes alone were lowered, the maternal death rate in the United States would be appreciably lowered and we would no longer have a rate for which we should feel shame.

Prevention of Early Infant Mortality.—A study also of the causes of infant deaths reveals the fact that practically one half of the deaths in the first year of life occur in the first month of life after birth, and one half of these occur in the first day of life from causes relating in some way to prenatal or obstetrical conditions. It would seem then that whatever can be done to lower this high infant mortality rate in the first weeks of life must be done by giving the mother skilled care during the prenatal and obstetrical period.

Prevention of Maternal Morbidity.—The toll from improper care is not paid by death alone. Many a woman living far below her optimum of physical and nervous vigor at a time in life when, with growing children, it is most important that she should be able to give the best to family life, is thus handicapped because she did not have adequate prenatal and obstetrical care.

Dr. Matthias Nicoll, Jr., when Commissioner of Health, State of New York, said: "The deaths annually of 14,000 or 15,000 women from causes directly connected with childbirth, and the chronic invalidism of many times that number, constitute a much graver problem than an equal number of deaths among the general population or among infants and young children, since in a large number of cases the death of a woman in

childbirth involves the disruption of a home, the future welfare of many dependent children, and other sociologic and economic factors, with which it is very difficult to deal.”*

Necessity for an Enlightened Public.—One great trouble is that the general public, men and women both, are not aware of these facts as they should be. When the public actually believes the facts that are available it will demand adequate care for the mothers and babies of this country.

The general comment of the public has been that pregnancy is a normal function, therefore, why all this bother about prenatal and obstetrical care? The primitive woman had her baby without any difficulty. Perhaps so, although we have no statistics on the maternal and infant mortality rate among primitive women and babies.

But we are not living in a primitive state of society. We are living in a highly complex state of civilization which obviously brings with it certain advantages but which brings dangers as well. Civilization is a development from primitive life. We have certain perquisites which the primitive woman did not have, but we also face certain dangers that the primitive woman did not face, dangers which are the inevitable accompaniment of our way of living. We should no more expect a woman of today to go through pregnancy and labor without the safeguard of the good care which she may have, than we should expect her to live in a cave without furnishings or some of the other seemingly essential products of this stage in our civilization.

Slowly, it often seems, but surely, the country is awakening to the fact that adequate prenatal and obstetrical care is important. In 1921 Congress passed the Sheppard-Towner Bill, an “act for the Promotion of the Welfare of Maternity and Infancy” which provided that States should have Federal aid to be matched in part by the State’s appropriation for carrying on some type of work, the purpose of which should be the reduction of maternal and infant mortality.†

* Presidential Address delivered before the State & Provincial Health Authorities of North America, Washington, D. C., May, 1929.

† In June, 1929, the Sheppard-Towner Bill went out of existence and the Newton Bill which proposed an extension of the Sheppard-Towner Act for five years did not come to a vote.

This was obviously a recognition of the fact that something should and could be done to lower the high maternal and early infancy mortality rate of this country. The states in developing their programs under the Sheppard-Towner Bill recognized that the first thing to do was to educate the public to the importance of prenatal and obstetrical care and what constituted adequate care. Through the printed word, pamphlets, circulars and newspapers, through the services of public health officials, physicians and nurses, through lectures before organizations, and through clinics, they carried on educational programs which had for their purpose the convincing of the public as to the importance of prenatal and obstetrical care and what such care meant. The radio, too, has taken part in this educational program.

Development of Obstetrics as a Specialty.—Obstetrics has developed as a special branch of medicine and more women are today receiving the care of obstetricians, or those with special training in obstetrics, during their pregnancy and at confinement. Certain products of our industrial age have made the services of specialists, the obstetrician particularly, more easily available to women scattered over a larger area. The telephone, the automobile, good roads (an inevitable result of automobiles) make it possible for a physician to care for certain types of cases over a wide area instead of caring for every type of case in a small area which was all he could possibly cover in the days when people had to go to get him and when he could go only as far as his horse could take him. The fact that hospitals can serve people scattered over a wide area, since patients too can travel generally by automobile, is another factor which has facilitated the development of specialties in medicine. The time consumed in visiting from house to house is eliminated as more people make use of hospitals.

Wide areas of our country are still, however, without adequate medical service or without physicians who have had adequate obstetrical training, facts of grave moment to those concerned with the problem of lowering the maternal mortality rate of this country. A thoroughly awakened public would do much to better conditions.

It is interesting to note the attitude of the public in regard to paying for the services of the obstetrician. To have adequate care a woman should consult her physician as soon as she suspects she is pregnant and she should report to him at frequent intervals during the pregnant period. Various tests should be made from time to time. At the time when the baby is born the physician may have to give hours of skilled care to the woman, care on which her life and the life of the baby may depend. For ten to twelve days after the baby is born the physician will visit his patient regularly and before discharging her he will want to see her about a month or six weeks after the baby is born to make an examination and assure himself that the condition of the uterus is as it should be. The usual reaction on the part of the public is to expect this service for a very small fee and yet this same public may pay without murmuring a much larger fee to the surgeon who takes out an appendix, a matter of a comparatively short time. The woman and her baby need skilled care if the maternal and early infant death rate is to be lowered and the optimum of health for mother and child secured. The practice of obstetrics must be recognized as a specialty needing highly skilled physicians whose services can be called upon especially for the difficult cases. It is not to be expected that every woman in the country can have a specialist, but we can certainly look forward to a time when women can have adequate care by well-trained physicians and nurses who can call upon the more highly skilled if the case presents difficulties which they themselves are not prepared to handle.

Pregnancy, However, a Normal Function.—Pregnancy is, nevertheless, a normal function; one which most women experience and which they can, in a high percentage of cases, experience successfully if they have been taught what good care is and how they can obtain it for themselves. A knowledge of this process so vital to the race should be had by all women and men too, if this important time in a woman's life is to be met with the intelligence and wisdom it deserves. The pregnant period, even though pregnancy is a normal function, is a time in which enormously significant changes are taking place within the body of the woman. Every pos-

sible care should be taken to bring those changes to a highly successful conclusion for both mother and baby. Many physicians advise that the patient should see her physician once in three weeks for the first five months; every two weeks until the end of the seventh month; every ten days through the eighth month, and once a week through the ninth month.

PHYSICAL CHANGES TAKING PLACE IN PREGNANCY

Enlargement of the Uterus.—The two distinct effects upon the mother that result from pregnancy are the growth of the uterus and the growth of the mammary gland. The uterus, situated within the pelvis, must stretch from a small, almost solid organ, shaped something like a pear, about three inches long and weighing about two ounces, and must grow into a thin-walled muscular sac, weighing about 2 pounds which will hold a 7 or 8 pound or even larger baby, a placenta weighing about $1\frac{1}{4}$ pounds, about 20 inches of umbilical cord and a quart or more of amniotic fluid by which the baby is completely surrounded. The capacity of the uterus has to increase about 500 fold in order to do this, and its total weight and contents becomes about 15 pounds. This thin-walled muscular sac must have, when the time comes, power to contract with such force that the baby and placenta will be expelled from the uterus through the vagina into the world in which the child is to live. The greater part of the growth of the uterus occurs during the first three months of pregnancy. This increase in weight is due partly to the growth of new muscular tissue and partly to an increase in the size of the muscle already present. A woman, to accommodate herself to the change in size, weight, and position of the uterus, sometimes noticeably changes the way she carries herself, tending to throw her head and shoulders back.

Because the uterus is attached to ligaments which are fastened to the pelvis, and is not fixed in a stationary position, it is enabled as it grows to push upward into the abdominal cavity, which it does about the fourth month, the top of it reaching the umbilicus by the sixth month and the diaphragm by the ninth month. During the last two or three weeks the uterus drops back toward the pelvis again, and the change

in the contour of her body indicates to a woman that she is drawing near the end of her pregnancy.

Enlargement of the Mammary Glands.—Accompanying the growth of the uterus as one of the maternal changes in pregnancy is the enlargement of the mammary glands. At the time of puberty the mammary glands increase in size, but this growth is confined largely to connective tissue; the milk producing or glandular tissues remain rudimentary and functionless. At the time of conception the glandular tissue is in some way stimulated to further growth. During the latter part of pregnancy the mammary glands produce an incomplete secretion, scanty in amount, known as colostrum. After the child is born the glands are again brought under the influence of special stimuli. They become rapidly enlarged and a more abundant secretion is formed. For the first day or two after the child is born this secretion still has the characteristics of colostrum, but usually on the third or fourth day the true milk is formed.

It is evident that there is a physiological relationship between the developing uterus and the mammary glands. That the ovary also shares in this influence, either directly or through its effect on the uterus, is shown by the fact that after removal of ovaries the mammary glands degenerate. This influence of the ovaries upon the mammary secretion has been attributed both to an action of the central nervous system and to the effect of an internal secretion of the ovaries. There can be little doubt that the addition of a mass of new and active protoplasmic tissue such as is represented by the fetus will result in an increase in the total metabolism of the pregnant woman as contrasted with the same woman in a nonpregnant condition. The new growth represents an addition of some 10 to 14 per cent of the original body weight and must add an extra quota to the number of calories required for maintenance. Harding⁵⁹ cites the work of Root and Root who followed fortnightly the basal metabolic rate in a pregnant woman from the fourth month of pregnancy until the ninth week of lactation. They found that from the sixth month the rate steadily rose until some six weeks before delivery when it was 23 per cent greater than at four months.

The total increase in weight was but 14 per cent, and a non-pregnant woman showing similar increase in weight would have increased her metabolic rate only 5 per cent.

Influence of Growing Fetus on Metabolism of Mother.—

The growth of the fetus has also an important influence upon general metabolism and therefore upon the whole maternal organism.

Increase in Weight.—Randall¹¹⁴ at the Mayo Clinic has made a very interesting study of weight in pregnancy and has emphasized the importance of watching weight during that period. He studied 200 normal women pregnant for the first time who made an average total gain of 23.2 pounds, 7.75 pounds being added in the last eight weeks. He also studied 100 women who were pregnant, but not for the first time. Their average gain was 21 pounds, 5 pounds being added in the last eight weeks.* He compared these gains with pregnant women who were toxic. The average total weight gain of toxemic patients was 44.5 pounds as compared to a gain of 23 pounds for normal patients in first pregnancies and 21 pounds for normal patients in other pregnancies. This total weight gained is not as significant as the fact that 25.4 pounds was gained by toxemic subjects during the last eight weeks of pregnancy, compared with 7.75 pounds for first pregnancy and 5 pounds for later pregnancies. During the first three months the toxemic women have a greater tendency to lose weight. Randall has concluded, therefore, that excessive gains are dangerous. It should be kept in mind that every pregnant woman with excessive gain in weight is not to be considered predisposed to eclampsia—but wherever excessive gains occur additional precautions should be taken.

Other Changes.—The question of the changes which may take place in the heart and blood is not settled, but there are various theories in regard to these matters and further research is necessary before a solution can be reached. Every portion of the maternal organism reacts to a greater or less extent under the influence of pregnancy. Formerly, these changes were attributed in great part to nervous impulses

* It must be remembered in considering the increase in weight that the enlarged uterus and its content accounts for about 15 pounds.

originating in the pregnant uterus, but more extended clinical observations and experimental work show that such is not the case, and indicate that such changes can be explained only by the supposition that they are in some way connected with the circulation in the blood of substances concerning whose nature we are as yet ignorant. It is also believed that certain changes take place in the respiratory tract during pregnancy. There is during pregnancy, especially the later part, a normal increase in the vaginal secretion, which has antiseptic qualities. This is looked upon as an additional safeguard against infection during labor.

Various organs in the body during pregnancy seem to be more active and possibly less stable. Skin glands increase their activity, the skin being an important excretory organ, and perspiration may increase. There may also be a more luxuriant growth of hair, and some women whose hair has been lifeless and brittle before pregnancy notice that it seems to show a much more healthy condition during pregnancy. Although there may be various discomforts during pregnancy, and although there may be serious complications, it is often true that women show during this period an improvement in their general health which continues even after the baby is born.

SIGNS OF PREGNANCY

Probable Signs.—*Cessation of Menstruation.*—The sign universally accepted by women as an indication of pregnancy is the cessation of menstruation. Its cessation cannot, however, be taken as a positive sign of pregnancy, although its continuance may be considered as fairly good evidence that pregnancy is not existent. There may be some bleeding which occurs at fairly regular intervals during pregnancy which is due to other causes and is not true menstruation. In case of an abdominal pregnancy a woman may menstruate regularly. The cessation of menstruation as well as some of the other probable signs of pregnancy may be due to other causes. In no case should a symptom which may be due to another cause than pregnancy be taken as positive proof that a woman is pregnant.

The missing of a menstrual period by a woman of child-

bearing age, who is ordinarily regular and who is in good health, should make her suspect pregnancy. She should in such a case seek her doctor for confirmation of her diagnosis and for advice. The woman whose menstruation has not become reestablished following the birth and nursing of a previous baby will not, of course, be able to count on this as a sign of pregnancy.

Changes in the Breasts.—Other indications of pregnancy which a woman notices about the second month are an increase in the size and firmness of her breasts and the greater prominence of the veins of the breast. The nipples become darker and more prominent, and the areola (the dark circles around the nipples) increase in size and also darken, particularly in brunettes. There is often a pricking or tingling in the breasts even before they increase in size. Sometimes they become very tender soon after conception and may remain so for some time. Later on in pregnancy small lumps appear in the areolae.

Increased Frequency of Urination.—Early in pregnancy there may be an increased frequency in the desire to urinate due, not as so many women think, to kidney trouble, but to the congestion of the base of the bladder, as all pelvic organs are congested at this time. The need for frequent urination is so often a sign of some nervous tension that, by itself, it cannot be considered a sign of pregnancy. It is simply additional circumstantial evidence when other signs of pregnancy are also present.

Enlargement of the Abdomen.—Other signs of change in her body which the woman will notice as additional indications of her pregnancy are the enlargement of her abdomen (noticed about the fourth month) which is accommodating itself to the growing uterus. The movement of the baby is noticed between the eighteenth and twentieth weeks. As the skin stretches over the enlarged abdomen the tissues just under it sometimes give way and pinkish or blue streaks appear which are called striae. These striae turn white and remain as scars on the abdomen after the baby is born and the abdomen has returned to its normal size. As the abdomen enlarges the umbilicus (navel) instead of being deeply

indented, flattens out and sometimes protrudes. There may be also a deepening of color in other parts of the body. A dark streak may appear on the abdomen stretching from the umbilicus to the pubic hair. Yellowish blotches sometimes appear on the face and dark circles under the eyes.

These various changes in her body which the woman herself may observe are all so-called "probable" rather than positive signs that she is pregnant. To sum up, one may say: The woman who is of child-bearing age, whose menstruation ceases although usually regular, whose breasts enlarge and tingle for a time, and whose nipples darken, who soon after the cessation of menstruation has an increased desire to urinate, especially at night, whose abdomen enlarges and who perhaps has some sensation of nausea during the day, is probably pregnant. There are probable signs of pregnancy which the doctor can discover in the early months before the positive signs can be detected and which may be considered fairly reliable signs. Characteristic changes take place in the shape, size, and consistency of the uterus very early in pregnancy and can be detected by vaginal examination by a physician.

Positive Signs of Pregnancy.—But the proofs positive as well as additional probable signs of pregnancy are found by the doctor.

Fetal Heart Beat.—The detection of the fetal heart beat about the twentieth week or shortly after is an absolute sign of pregnancy and can be detected by the stethoscope or sometimes by placing the ear against the abdomen. The rate of the fetal heart is about 140 per minute or about twice that of the mother. It is sometimes by hearing two fetal hearts of different rates that a diagnosis of twins is made.

Palpation of the Fetus.—A second positive sign by which the doctor can make a diagnosis of pregnancy is by palpating the fetus. He can by about the seventh month feel the outline of the baby's body through the mother's abdominal wall, and in this way can tell the position in which the baby is lying in the uterus, knowledge of which may be helpful to him at the time of labor.

Movements of the Fetus.—The third positive sign is the

detection of the active and passive movements of the baby. The mother may herself detect the active movements of the baby, and the doctor by a special technic may detect the passive movements. In doubtful cases of pregnancy, x-rays are sometimes taken at about the sixth month. If the baby shows up in the picture it is a positive sign of pregnancy, but the absence of indications of the baby in the picture does not always mean that there is no baby in the uterus.

Laboratory Tests.—Certain laboratory tests have been developed in the last few years which are used in diagnosing pregnancy at a very early date, the Aschheim-Zondek test and the Friedman test. In the former the urine of the patient is injected into immature female mice, in the latter into rabbits. If pregnancy exists characteristic changes take place in the ovaries of the animals due to an excess of the anterior pituitary hormone which is present in the urine of a pregnant woman.

RÔLE OF DIET IN PREGNANCY

The scientific groups seem in agreement as to the important rôle of diet in maintaining the health of the mother and supplying the material needed for the child to build a strong body. Such controversy as arises usually centers around such questions as "Shall a pregnant woman have milk throughout pregnancy? Is a quart the desired amount? Does drinking of milk influence the difficulty of labor? Does milk drinking make a fat baby? How much and how often a day should a pregnant woman have meat? If only a limited amount of protein is allowed should egg be taken in preference to meat? How much should the food intake be increased above the normal to meet the demands of pregnancy?"

Slemons and Fagan.—Slemons and Fagan¹³⁶ like Randall, emphasize the need of precaution necessary to avoid overweight. According to them the total gain in weight during pregnancy should normally be 15 pounds if the woman is of normal weight at the beginning of pregnancy. In order to maintain such a weight, they recommend very light meals, eliminating cake, candy, pastry, pie, and rich desserts. They advise milk only during the first period of pregnancy, in-

dicating that after quickening is experienced milk should not be taken because it is too fattening. In order to limit increase in weight a diet of only 2000 calories is given. The following gives a sample of this diet:

For Breakfast: Coffee or tea with toast and very little butter.

Mid-morning: A cereal with milk—no cream.

Lunch: Bread with egg or soup or salad.

Mid-afternoon: Orange juice, tea or bouillon and crackers.

Dinner: One chop, or an equivalent, 2 vegetables in moderate quantity without second helping; a simple dessert, preferably fruit.

It is clear that these authorities question the use of milk in any but the early stages of pregnancy, and their recommended diet is low in carbohydrate. This diet is criticised because it is not "ample in vitamins and calcium for the optimum growth of the fetus and maintenance and repair of the mother's tissues."

Sansum.—Sansum,¹²⁵ on the other hand, advises 2200 to 2500 calories for the pregnant woman, with exercise and reduction of fat rather than of carbohydrates in the diet to control weight without endangering the acetone type of acidosis. He believes that the diet of the nursing and pregnant mother should be high in protein. In addition to the normal amount of protein she should have not less than 1 quart of milk per day. He believes the mother needs two eggs, one serving of meat, fish, or fowl or the equivalent.

Day.—Day³⁰ thinks the pregnant woman should have meat, fish, and eggs in moderate-sized portion daily unless kidney condition or increased blood pressure makes it necessary to diminish the amount. He recommends 3000 or more calories during the first period (first three lunar months) particularly if she is undernourished, while during the second period (second four lunar months) she can have less, and during the third period (last three lunar months) the caloric intake should be about 2000 calories especially if she has a tendency toward obesity. In view of the fact that the energy requirement of a woman during pregnancy, especially toward the end of the period, is considerably above that of the same woman in the nonpregnant condition (estimated at 2400 to 2800 calories) 2000 calories might be questioned as being

adequate. The metabolic determination made by Root and Root¹¹⁸ indicates that six weeks before delivery the basal metabolic rate of a pregnant woman was 23 per cent greater than it was at the four-month period.

Royston.—The diet for the pregnant woman outlined by Royston¹²³ contains whole grain cereals; fruit, raw or cooked, 200 Gm. (7 ounces); raw or cooked vegetables, preferably the green leafy variety such as lettuce, spinach, cabbage, onions, etc., 300 Gm. (10.7 ounces); cow's milk, 1 quart or 30–50 Gm. of cheese (1 to 1½ ounces); citrous fruit juices for vitamin B and C, 200 Gm. (7 ounces); meats of any kind but especially liver, valuable for vitamins or blood regenerating properties; fish for its iodine content; fats rich in vitamins, cream and butter; fluids 1½ quarts to 2 quarts per day.

Rose.—Rose¹¹⁹ advocates no increase in energy until the fifth month. The increases she says are proportionate to increases in body weight. In the latter months of pregnancy a sedentary woman will need between 2400 and 2800 calories. A usually active woman will probably not require over 2800. Increased body building materials and vitamins are best met by liberal use of milk and eggs, fruit and green vegetables, the sun baths, and cod liver oil. A day's diet should include, according to Rose, the following classes of food:

1. Whole grain cereal.
2. Milk. One pint to one quart.
3. Fruit

Fresh fruit daily.

4. Green vegetables

Especially raw vegetables—lettuce, carrots, turnips, cauliflower.

5. Meat, fish, eggs, liver or cheese once a day.
6. Concentrated source of fat (butter, peanut butter, bacon, etc.).

The last two to three months frequent small meals are often better than a few large ones.*

Stuart.—Stuart¹⁴⁴ says in discussing Diet in Pregnancy: "The fetus needs proportionally more of the kinds of foods which build new tissues than of those which simply provide

*Rose, M. S., "Feeding the Family," pp. 113–114 (1931 ed.).

energy because he is growing so rapidly. Hence, the drain upon the mother's supply of proteins, calcium, and the like will be particularly great. It is, therefore, important to have her diet contain ample amounts of these, but it does not follow that she must eat a great deal more than she is accustomed to. As a matter of fact, the total amount of food which she needs from day to day changes very little and is probably at no time increased by more than 20 per cent because of pregnancy. In the early months the fetus is so small and gains so slowly that the calories he requires represent a very small fraction of what the mother eats. In the later months her activity is necessarily curtailed and the calories normally consumed by active muscles are undoubtedly deflected for the use of her rapidly growing offspring. Overfeeding may be positively harmful to her, for excessive gain in weight has much to do with the discomforts if not the dangers of pregnancy.

"The balance of the diet is far more important than its caloric value and it may be that the customary diet will not be suitable during pregnancy. The various salts are all needed in liberal amounts, but the need for calcium is particularly high, as it is such an important element in the formation of bone and teeth. The fetus must store considerable amounts of iron in his tissues during the late months of pregnancy and the mother's diet should consequently be rich in this element. Protein and the various vitamins should also be amply provided.

"It should not be feared that the baby will immediately suffer, if the mother requires a special diet with some of these foods reduced or omitted. Nature protects the baby at the expense of his mother, stealing calcium from her teeth and bones to build his bones, and using up other tissues to provide the elements necessary to build his tissues. It is only after fairly prolonged and marked underfeeding that the baby will show malnutrition. If possible, however, the diet taken during pregnancy should protect the mother from any such depletion and provide amply for baby as well."

Mendenhall.—Dr. Mendenhall⁹³ emphasizes the importance of *diet* during pregnancy. "We must give up the present

prevailing view that the pregnant mother's diet can be left safely to chance or to whims of her appetite and no longer counsel her to 'eat what she is accustomed to' or 'plenty of good nourishing food.'” Mendenhall advises the addition of 500 calories to the diet of an active woman who is pregnant and this should be largely added in milk, eggs, fruit and vegetables. She points out the effect of long undernourishment of mothers in Central Europe as a result of the world war. The birth weight of the newborn, the ability to produce milk, the quality of the milk produced, and the appearance of rickets in the offspring, as well as osteomalacia (hunger rickets) in the mother herself were all results of undernutrition.

Park—*Park** has written, “Personally, I believe that if pregnant women received ample well-balanced diets, in which green vegetables were abundantly supplied and cow's milk was regularly taken, and kept a sufficient part of their time in the open air and sun, and if their infants were placed in the direct rays of the sun for a part of each day and were fed cod liver oil for the first two or three years of life, more could be accomplished in regard to the eradication of caries of the teeth than in all other ways put together, and that rickets would be abolished from the earth.”

What Requirements Should Be Met by Diet of Pregnant Woman.—During the early stages of pregnancy, that is, through the fourth month, the actual increase in energy demands is small. The pregnant woman can eat usual amounts being sure that her diet is ample and well-balanced. It is during this period that women are likely to experience nausea and digestive upsets. Ample food easily digested and the avoidance of overtaxing the digestive tract with a larger quantity of food than is needed is important as well as to avoid fatigue, worry, undue excitement, and constipation. Serious digestive disturbances should be referred to a physician promptly. During the middle period, that is, in the fifth, sixth, and seventh months, *Bogert*† recommends a 10 per cent increase above the woman's normal intake keeping protein foods,

* Quoted from *Sherman*.¹³⁰

† *Bogert*, L. J., “Nutrition and Physical Fitness,” p. 434.

especially meat, low as too much may be a contributing factor in causing high blood pressure, disturbances of kidney function and the convulsive seizures (eclampsia) which sometimes appear in late pregnancy. Constipation may appear during this period and a diet containing bulky laxative foods will be of assistance. Such foods as milk, whole grain cereals, fruits and leafy vegetables, are the best types to include for this purpose.

During late pregnancy, eighth and ninth month, the fetus makes rapid growth and increased demands are made upon the mother's body for tissue-building foods. Bogert advises at this period an increase of 20 per cent in calories above the average daily intake. It is especially important that the foods eaten by the mother be especially rich in all the elements needed by the child for building his body.

Mineral Requirements.—Emphasis cannot be laid too strongly upon the importance of adequate minerals in the diet especially during pregnancy, and calcium is one of the most important of these because of its relationship to the bone and tooth formation in the fetus. The calcification of the teeth of the fetus probably begins before the fifth month of pregnancy. Table XVIII indicates the amounts of some

TABLE XVIII

GROWTH OF THE HUMAN FETUS COMPUTED FROM THE TABLE OF MICHEL*

Week of pregnancy.	N.		P.		Ca.		Mg.	
	Content of ovum.	Added per wk.	Content of ovum.	Added per wk.	Content of ovum.	Added per wk.	Content of ovum.	Added per wk.
16.....	4.28	1.13	0.67	0.20	0.38	0.41	0.026	0.017
20.....	8.81	.....	1.47	.....	2.03	.....	0.095	.....
21.....	.....	1.81	.....	0.25	.....	0.43	.....	0.017
28.....	23.28	.....	3.58	.....	5.39	.....	0.234	.....
29.....	.....	6.87	.....	1.28	.....	2.09	.....	0.064
40.....	105.76	6.87	18.93	1.28	30.51	2.09	1.004	0.064

* Lusk,⁸¹ Graham, "Science of Nutrition," Fourth Edition, p. 535 (1928).

minerals needed in the diet during the last twenty-four weeks of pregnancy. From the twenty-ninth to the fortieth week the calcium content of the ovum increases from 5.39 to 30.51 or an increase of 25.12 Gm. As indicated in Table XVIII this would require a storage of 2.09 Gm. of calcium weekly. The maternal diet needs to be carefully planned in order to meet such a requirement. Failure to provide adequate amounts of calcium will, according to Bogert, "usually result in the development of the fetus at the expense of the calcium-rich tissue in the mother's body (bones and teeth), which may in turn lead to decay of the mother's teeth and to weakness in her bones. If the shortage is extreme it may be the cause of improperly developed teeth and poor bones in the child."

Mendenhall⁹³ believes that the need of the pregnant woman for calcium is half again as much if not twice as much, as that of the nonpregnant woman, or not far from 1.1 to 1.4 Gm. of calcium daily.

If the diet of the pregnant woman is to be rich in calcium-containing foods, milk, egg yolk, whole grains and green vegetables must have an important place. Of these foods milk is probably the most economical as a source of calcium.

Since the mineral matter of bones consists chiefly of calcium and phosphorus, phosphorus is just as essential to the diet as calcium. Phosphorus occurs also in almost every tissue of the body. Phosphorus occurs in most of the protein-rich and calcium-rich foods—so that if diet is adequate in those two elements it will in all probability contain sufficient phosphorus.

Ultraviolet rays are important in the utilization of calcium; vitamin D (in the form of cod liver oil) or sunlight are as important as calcium and phosphorus especially during the winter months in northern climates.

Iron as a mineral essential for blood building of the mother and fetus follows next in importance to calcium and phosphorus. Day indicates as a standard for iron requirement 0.0001 Gm. per pound of body weight. The total adult daily requirement is frequently estimated as 0.015 Gm. It is quite evident that this requirement is increased during pregnancy because of the amount needed not only for the mother's blood

but for the blood of the fetus and a storage in the liver of the fetus adequate for the demands of the first year of its life. Fruits, vegetables, egg yolk, red meats, and glandular organs such as liver, kidney, etc., are high in iron content. Recent research points to the relation between copper and iron metabolism as well as a possible relationship between iron metabolism and vitamins especially vitamins A and D.

Iodine.—With many women during pregnancy the thyroid gland may become overactive, which demands an increased amount of iodine to provide for the secretion of this gland. Under ordinary circumstances the diet would supply sufficient quantity since there is some reserve in the gland itself, but if the diet has been low in iodine as may occur in the region of the Great Lakes and the Northwest where the amount of iodine in soil, water and foodstuffs is very low, it may have to be supplemented. This should be done under medical direction. Oleson¹⁰³ of the U. S. Public Health Service states that “during pregnancy iodine should be administered under the direction of a medical attendant, thereby preventing the development of goiter in the child as well as in the mother.” With the exception of the “goitrous regions” a diet with an abundance of green vegetables, whole cereals, and some sea foods will meet the average demand for iodine.

Vitamins.—At the present time an adequate diet cannot be discussed without reference to *vitamins* which during the last ten years have contributed much to the growing interest in diet not only through the research of science but also through the family kitchen. The foods essential for providing vitamins and minerals in pregnancy, recommended by Mendenhall⁹³ are: “1 quart of milk, one egg, one raw vegetable salad, such as lettuce, celery and tomato, one citrous fruit, one cooked green vegetable, two slices entire wheat or graham bread or 1½ ounces whole grain cereal. If a helping of lean meat, potato, and three servings of butter and cereal or bread are added to these foods, a diet sufficient in calories and adequate except possibly in iodine, will be furnished a normal mother. More fruit and vegetables may be substituted in place of additional carbohydrates, if the energy needs to be curtailed.” Such a diet high in green vegetables and fresh fruit, whole

cereals with butter, possibly a small amount of cod liver oil will have sufficient of all of the vitamins.

Bulk.—Sansum¹²⁵ makes a very special point of emphasizing the importance of bulk in the diet. He believes that "individuals who are taking a quart of milk per day together with two pounds of the fruit and vegetables so necessary for the prevention of constipation, and the supplying of an adequate amount of alkaline and mineral foods need have no fear about vitamin deficiencies." The residue-containing foods are fruits, vegetables, and whole grain products. Apples, bananas, dates, figs, and raisins are, according to Sansum, especially efficacious. As has been said, diet should be used as the method for controlling constipation, rather than cathartics.

Water.—Water is important in the normal functioning of the body, and especially so in pregnancy. Day advises six to eight glasses a day which includes the amounts taken in beverages, soups, etc. The expectant mother should take care that her water intake is adequate for this is essential for adequate elimination both through the kidneys and skin. No increased burden should be placed upon the kidneys by a limited water intake.

GENERAL HYGIENE OF PREGNANCY

Elimination.—*Bowels.*—Food intake is one important aspect of the nutritional cycle. The other important aspect of this cycle is elimination. The need of a regular bowel movement cannot be too greatly emphasized. It is not a matter to be ignored until pregnancy occurs, for the establishment of a regular bowel movement at a regular time each day from early childhood is essential as a health measure at any time but is especially important as a safeguard against the constipation in pregnancy. If in spite of a well-established habit in regard to the bowel movement, constipation does occur a woman may add certain laxative foods to her diet and increase the amount of water she drinks, taking a glass or two on first rising in the morning, which stimulates peristalsis if she has not already established this excellent habit. She should keep up her usual amount of exercise unless for some reason the doctor has advised against it, for a change to a

sedentary life after an active one sometimes increases the tendency to constipation.

The Kidneys.—The importance of the kidneys as an excretory organ has already been stressed, but so important are they that they cannot but be mentioned again when discussing the hygiene of pregnancy. The patient knows herself whether or not her bowels are moving adequately each day, but she cannot tell whether or not her kidneys are functioning properly unless she reports to the doctor. He will want to know the amount of urine passed in twenty-four hours, and will also want a sample of urine at given intervals. The woman can help her kidneys to satisfactory functioning by not giving them too much work to do, that is, by eating a proper diet and by drinking plenty of water.

The Skin.—The skin, too, may be helped to do its work in a satisfactory manner. Through the action of the sweat glands the skin always serves as an important excretory organ and it is having additional work to do during pregnancy. In addition to the obvious perspiration the skin is also constantly excreting waste products of which we are not conscious. A woman who seems to perspire more freely during pregnancy should not be troubled by it or attempt to stop it but should try to aid the activity of the skin by drinking plenty of water, breathing deeply, exercising, and dressing warmly enough. Daily warm baths not only serve to stimulate the skin but also to remove the waste matter that has collected on it. A woman who becomes thoroughly chilled because not dressed warmly enough may seriously inhibit the action of the sweat glands, reduce the efficiency of the skin as an excretory organ, and thus throw an extra burden on the kidneys.

Fresh Air and Sunshine.—Plenty of fresh air which we all know is important for healthful living is another matter which should be mentioned when discussing the hygiene of pregnancy. The oxygen which a woman needs for herself and the growing fetus is taken into her lungs and the carbon dioxide which has come from the fetus and from herself is given off from her lungs. She should take particular pains to keep the rooms of her house well ventilated and to get out of doors every day. Another reason for getting out of doors every day

is for exercise and sunshine, the ultraviolet rays of which we know are a protection against the development of rickets.

Exercise and Rest.—Walking is an excellent way in which a pregnant woman may get her exercise for it makes use of and thus strengthens the muscles which will be active in labor. Exercise to which the woman is accustomed may be taken in moderation, but the risks of bad jolts, jars or falls must be considered and exercises which incur any such danger should be avoided. Housework is also an opportunity for exercise during this period, and is an excellent way to keep the muscles in good condition, as well as to further the normal functioning of digestion and elimination.

The danger of getting overfatigued has been mentioned and one way of avoiding it is by taking plenty of rest. An extra rest each day and at least ten hours in bed each night not only is an insurance against fatigue but is also helpful in relieving pressure symptoms.

Clothing.—The clothing of a woman in pregnancy deserves consideration. The danger of tight clothing is not as great these days as it was formerly but it is well to remember that no clothing should be worn which would in any way hinder the veins of the lower extremities from functioning as they should. Round garters and tight bloomer elastic should be avoided. As the woman increases in size a properly fitting maternity corset should be worn which should support the uterus without binding and which can be adjusted to the changes in the figure. A brassiere which supports the breasts, thereby giving relief from the discomfort of congestion, should be worn but it should not compress the breasts.

As the woman increases in size and changes her mode of walking to some extent, she may feel somewhat unsteady on her feet, and be conscious of the need of a firmer base on which to stand, that is, she may need to change her shoes to a larger size with lower heels. But she must be sure that her arches are well supported as her increased weight might cause a flattening of the unsupported arch. High French heels are uncomfortable, sometimes causing backache. They do not support a woman as securely as lower, broader heels, and are

thereby likely to increase the danger of her turning her ankles or falling.

Care of the Teeth.—The care of the teeth is another important matter in pregnancy. Some authorities believe that there is a tendency toward increased acidity in the stomach and the mouth during pregnancy. Acid in the mouth attacks any crack in the enamel and makes a condition which is propitious for the development of decay by the action of bacteria. Since the fetus must be supplied with calcium for skeletal development, and since the provision seems to be that the mother will supply for the fetus even to her own detriment if need be, it is generally believed that if the mother's diet is deficient in calcium the calcium needed by the fetus will be taken from the mother's bones and teeth. If the teeth suffer a loss of calcium they are more likely to decay, which probably accounts for the old saying, "for every child a tooth." There is great controversy regarding the cause of caries (decay) but clinical observation and the experience of physicians indicates that diets adequate in calcium, phosphorus and vitamins, especially vitamin D, protect the teeth against the demands being made by the fetus on the mother's daily calcium intake. Some authorities advise using a slightly alkaline mouth wash to reduce any acidity which may exist in the mouth. Dental care during this period is needed and the teeth should be examined at least twice during the period.

Care of Breasts.—During pregnancy certain changes are going on in the breasts preparatory to the nursing of the baby. The whole question of lactation and the factors affecting the secretion of milk is still a debated one, but it can probably be accepted as a safe general rule that a wholesome, healthful routine of living without undue emotional strain of one sort or another should help rather than hinder the satisfactory functioning of the breasts. In addition to this general rule, certain specific things can be done especially for the nipples which probably lessen the danger of infection from cracked nipples later on and which make nursing easier for both mother and child. If the nipples seem so flat that they will be hard to grasp, something should be done during pregnancy to

prepare them for nursing. The doctor's advice should be sought in regard to this.

DISTURBANCES IN PREGNANCY

Minor Disturbances.—It is recognized that every woman during pregnancy may react individually to the physical changes taking place in her body. She may experience certain discomforts, which with intelligent treatment may be relieved. Her physician should be the one to advise her for it is he who can differentiate between the minor disturbances and the serious complications as well as the one who can give her the best advice as to treatment.

Nausea.—It is estimated that one third of all pregnant women suffer at some time during pregnancy from nausea or "morning sickness," but it should be borne in mind that "morning sickness" is not an inevitable accompaniment of pregnancy. Most physicians are convinced that a psychic element often influences this phenomenon, and that many women suffer from nausea because they expect to and for no other reason. Even when the nausea is the result of actual physical disturbances, however, simple measures, and suggestions made by the physician will prevent it from developing into a habit. One's attitude of mind has much to do with this happening and it is important that women should cease taking the attitude that they are bound to have "morning sickness" and that nothing can be done about it. Physical disturbances which cause nausea are negative nitrogen balance, fatigue, acidosis, and starvation. The cause of nausea is most commonly attributed to acidosis. That acidosis will in itself produce vomiting is destitute of proof, since in cases of diabetes where severe acidosis is present there may be an entire absence of vomiting.

Heartburn.—"Heartburn" is another discomfort which some women have during pregnancy. This sensation which has nothing to do with the heart is due to a gastric condition and may be relieved by simple remedies prescribed by the physician. Flatulence or gas in the stomach or intestine annoys some women. The action of bacteria on the foods generates the gas and it is probably increased in pregnancy because as the uterus enlarges it presses on the intestines and slows up peristalsis.

For this reason regular and free bowel movements are most important in order that waste products will not linger in the intestines.

Pressure Symptoms.—When one realizes the great increase of the uterus within the woman's body, it seems reasonable to expect that as it takes more room it is bound to press on other parts of the body and cause disturbances which, though not serious if treated correctly, are annoying. Pressure on nerves by the uterus may cause pain either at the spot where the pressure occurs or at a nerve ending. If the former, the pain is usually felt in the lower part of the back; if the latter, it usually causes cramps in the legs. Pressure symptoms are likely to be increased during the last few weeks of pregnancy when the enlarged uterus drops back into the pelvis and the head of the baby lies in the inlet through which it must pass at the time of birth. Any mechanical means which help to relieve pressure will help these symptoms.

Leukorrhœa.—There is a normal increase in the vaginal secretion during pregnancy and if this white discharge, called leukorrhœa, seems excessive, it should be reported to the physician as it may indicate a condition which calls for treatment.

Constipation is a very common complaint during pregnancy, but the foregoing discussion indicates how important it is that it should not be allowed to continue. Pressure on the intestinal tract is probably a contributing cause as is also the possible weakening of the abdominal muscles because of stretching. It may be necessary to resort to laxatives of some sort to relieve the condition, but every effort should be made to control the difficulty by diet.

The physical disturbances of pregnancy thus far discussed, as well as others which occur less frequently, are often annoying but not often serious, and it must be borne in mind that many women experience pregnancy without suffering from any of these disturbances who, in fact, feel better during that time than at any other time. Simple hygienic measures usually relieve them, and the attitude of the obstetrician always is that they should be relieved and never that they must be endured as an inevitable accompaniment of pregnancy. It

is, therefore, important to report any discomfort to the physician and get his advice as to methods of relief.

The More Serious Complications of Pregnancy.—*Toxemias.*
—In addition to these less serious disturbances of pregnancy there are the more serious complications which are the cause of such a high percentage of the deaths of mothers and babies. Of these the toxemias of pregnancy are doubtless the most serious. These are more likely to occur during the latter part of the pregnancy when the waste products thrown off by the fetus into the mother's circulation are increasing rapidly in amount. If something occurs to interfere with the metabolic process anywhere in its course the individual will suffer from some form of autointoxication. The fetus sending back through the blood vessels in the umbilical cord the waste products of his nutritional processes into the mother's circulation places an extra burden on her. If she is not able to meet this burden she suffers from a toxemia varying in degree from mild to extremely severe and dangerous, ending sometimes in convulsions and death. It is of the utmost importance that a pregnant woman should give every heed to living as hygienic a life as possible in order that she should give her body every chance of performing its functions satisfactorily, allowing no opportunity for the accumulation of waste products in her body.

An increase in the blood pressure and albumin in the urine may be the first indications that a toxemia is impending. Symptoms which the woman herself may notice and which should be reported immediately to her physician are, persistent headache, dizziness, blurred vision, spots before the eyes, puffiness of face, hands or feet (the latter, of course, may be due to pressure), vomiting which is more severe than "morning sickness," and severe pains in the abdomen. They may not necessarily be due to a toxemia but it is important to discover immediately whether they are or not, and the physician is the one to make the discovery and institute immediate treatment. A specimen of urine should be sent to the physician as soon as these symptoms are noticed. It is in order to guard against the development of toxemia that a physician, as a routine measure, takes the blood pressure and

examines the urine of a pregnant woman whenever she reports to him.

Miscarriage.—Overfatigue, malnutrition, bad falls or heavy jolts may induce an abortion or a miscarriage, but the uterus, because of the way in which it is suspended is wonderfully well equipped to withstand rather severe mechanical shocks without a miscarriage occurring. The uterus seems to be particularly irritable at the time in the month when the menstrual period would occur if the woman were not pregnant, and it is, therefore, wise to take extra precautions at that time, especially if a woman has had a previous miscarriage. The usual symptoms of miscarriage are bleeding and recurrent pain in the lower part of back and abdomen. They do not necessarily mean that a miscarriage will occur, but they are warning signs and a woman who notices them should go to bed and notify her doctor. Such precaution may prevent disaster. One of the dangers of miscarriages is the fact that women do not consider them serious and even neglect to call a physician when one occurs early in pregnancy. It is most important that a physician should be called as it is necessary to ascertain that the entire products of conception have been expelled from the uterus, otherwise the uterus will not return to its normal state and the woman runs the risk of trouble of various sorts later on. Another possible cause of trouble is that the woman may not take proper precautions after a miscarriage. She may fail to go to bed at all or get up too soon, and therefore the return of the uterus to its normal state is made difficult or prevented.

PSYCHOLOGICAL CARE OF THE PREGNANT MOTHER

Emotional Disturbances Sometimes Occur.—The expectant mother in the past has had comparatively few avenues for learning about the physiology of pregnancy, the meaning and significance of her physical disturbances, and what is to be expected as normal in pregnancy. This, no doubt, has been a contributing factor in one of the difficult problems with which physicians have had to deal in pregnancy—the undesirable psychological condition of some prospective mothers. Without the scientific knowledge which explains

some of the symptoms and conditions peculiar to pregnancy, women have in the past been dominated by the fears, anxieties, insecurity, and maladjustment to their lives, all of which may become magnified out of their true proportions during pregnancy. If the true sense of proportion about the basic adjustments of life becomes lost in pregnancy the resulting state of mind may be potent enough to induce physical conditions which border on the pathologic. Self-consciousness, the undue scrutiny of body functions, such as respiration and beating of the heart which go on automatically, minute analysis of feelings, and a tendency to introspection may lead to serious misinterpretation of conditions and sensations which are normal to pregnancy.

It is during the early months of pregnancy that patients are most likely to be self-centered and consequently suffer from the physical discomforts which are induced by poor mental health. Some women adopt during pregnancy a state of semi-invalidism and give way to nervousness, irritability, moodiness, fits of introspection, feeling sorry for themselves as part of their "rights" due to their physical condition.

Need of Freedom from Emotional Strain.—In addition to living a satisfactory life from a physical point of view, it is most important that a woman should have a life as free from emotional strain as possible. Often circumstances which are in no way under the control of the woman precipitate her into an emotional situation which inevitably affects her. It should be borne in mind, however, that a regular physical régime which helps to keep her in good physical condition should also help her to keep her balance emotionally. The relationship is subtle between the two and each seems to react on the other, but whatever can be done to maintain a serene and happy atmosphere should be done. The emotional atmosphere for the home at any period in family life should be one of happiness and self-control dominated by a note of mutual consideration for the independence and happiness of each member of the family group. During the period of pregnancy the emotional life of the home should proceed as nearly normally as possible. There is some difference of opinion as to whether pregnant and lactating women should

lead absolutely placid lives or not, but the general consensus of opinion is that a normally wide range of emotional experience will harm neither mother nor child. No woman should think that because she is pregnant she should stay at home all the time. She should continue her social pleasures as well as her work so long as it does not cause undue fatigue, and she should only cut them down to the amount that will avoid fatigue rather than cutting them out entirely. A well-organized plan of living with a wholesome amount of recreation planned for and not undertaken spasmodically on the spur of the moment lessens the chances of fatigue, worry and the accompanying evils of irritated temper or depression. To sum up the matter in a few words, a pregnant woman should expect to live a normal, wholesome life, taking certain precautions to avoid mishaps. On the whole she should live about as any married woman lives who lives healthfully, avoiding excesses of any sort but carrying on her ordinary work and play, and living a life which is satisfying to her, emotionally and sexually.

READJUSTMENTS IN THE FAMILY

During pregnancy the woman has nine months in which to make her plans for the arrival of her baby and to make the readjustments in family life which may be necessary. If there are other children they must be prepared for the new baby in such a way that they will welcome him into their midst with pleasure. It is not always easy for the one who has been the youngest and has therefore had the position of baby in the family to see his position taken by another who must for many months, at least, absorb much of the mother's time.

Telling the Children.—Often children long for a baby sister or brother and welcome the news of an expected arrival with pleasure, but care must be taken that they do not get erroneous ideas of the baby. It is important to tell them the truth about the matter and to realize that their knowledge of a baby may be so limited that they may picture the advent of some one who will immediately begin to play with them. They must know that the baby will be little and

helpless, will need much of mother's care, must be treated gently, may be a brother or may be a sister. They should know the truth about reproduction in simple but correct terms. It is not well to say that the baby is growing in mother's stomach, for example, for that is not the truth. The term that some people use in the effort to tell the truth although seemingly fearful of being too accurate, "growing beneath mother's heart" has a sentimental flavor about it which young children do not need. They accept quite simply and naturally the statement that the baby is growing inside mother's body in a special place meant for a baby to grow, called the "uterus" if one wishes to give it its name. There is no reason why the statement should not be made to them and every reason why it should. They have a wholesome normal interest in the matter and they should have the truth. If the mother is to go to the hospital when the baby is born the children should know that. If the hospital is near by it is well for them to see it or some other hospital in order that they may have a feeling of familiarity toward hospitals which engenders a sense of security. They should not have the shock of wakening some morning to find that mother has disappeared in the night and gone to some strange place they know not of. It sometimes makes a later visit to the mother while in the hospital a fearsome experience which leaves scars on the child's mind difficult to overcome.

Answering the Children's Questions.—Fear that children will talk makes people hesitate to answer their questions correctly and often induces them to hush the questionings as if it were not right for them to ask. But if children are going to talk it is better that they spread the truth among their friends rather than the untruths which may be given them by their parents or the unwholesome descriptions which they obtain furtively because their parents have forbidden their quite legitimate queries. The way in which parents answer their children's first question about the great and omnipresent fact of sex doubtless has much to do with the first attitude which the child will have toward sex. Those first patterns formed will possibly affect his whole outlook on sex and all its ramifications.

The matter of answering the children's questions about birth correctly is important not only from the sex point of view but also from another aspect. The questions about the birth of a baby or of animals which are usually asked at an early age are often the first questions which parents are tempted to answer untruthfully. This is true partly because they themselves have not acquired the right attitude and so find it difficult to answer such questions simply and naturally without emotional color, and partly because they have not acquired sufficient scientific knowledge to give them the correct vocabulary or enough background to answer the questions in a simple but truthful way. To reduce scientific truths to simple terms which can be grasped by a child and which can be given in the amounts he is ready to receive presupposes a sense of assurance which comes from having a sound basis of scientific knowledge at one's command.

Whatever may be the cause for the untruths or half truths which parents so often give in answering these first questions about sex, the fact remains that this may be the first time when parents fail to be honest with their children. In this way the first lessons in untruths may come from the parents themselves who complain a few years later of their children's tendency to falsehood. Another undesirable effect following a parent's attempt to hush a child's questioning is that a child thwarted in his normal desire for information may turn to undesirable sources, and may be less likely in the future to go freely to his parents with his questioning. To prepare the other children for the new baby by telling them the truth is therefore of prime importance. It may not be wise to do this until the later part of pregnancy as long months of waiting will seem unduly long to a child. Then too, since there is some probability of a miscarriage unnecessary disappointment to the children may result. It is well to delay the telling until obvious preparations are being made.

Children's Share in the Preparations.—In these preparations the children should have some share so that they may have toward the new baby a sense of ownership and responsibility which will do much toward warding off any feeling of resentment or jealousy because of the great amount of

attention the new baby will receive. The advent of a new baby must almost inevitably mean that the other children will seem to receive less attention than usual. Unless they are prepared for this in some way they may resent it and feel unkindly toward the baby.

If there is to be some readjustment of rooms in order that the baby may have a room to himself the children can help in making the change. The new baby clothes or those that have served the other babies may be arranged in the baby's bureau drawers or basket and the children thus learn how tiny and helpless the baby will be, needing the mother's attention for a long time after he is born. The crib can be seen by the children and they may delight in helping make it up with the tiny sheets and blankets. They can, indeed, join in all the preparations for the new baby, thereby learning in a normal wholesome way something about the birth and the care of a baby.

If the children have a special desire for a brother or sister they must know that no one knows about that before the baby is born, and they must be prepared to welcome either brother or sister. It is important for parents to refrain from expressing their desires in regard to this matter too freely before the children lest the children but reflect the attitude of the parents which is so often not as fixed an attitude as it sounds to be. But a child may take the parents' expressed preference more seriously and so be less ready than they to make the adjustment to disappointment.

Adjustment to Pregnancy in the First Year of Married Life.—If the baby is to come within the first year of married life it means that the woman becomes pregnant very soon after marriage. The first year of married life calls for many adjustments and if the woman becomes pregnant during that year it means that she will be having to make these adjustments at a time when she is possibly suffering from some of the physical disturbances which may be the accompaniment of pregnancy. It sometimes puts a rather heavy burden on both the man and the woman and therefore the first year of married life may be fraught with many trials which the young man and young woman were in no way prepared to

expect. There is the sex adjustment to be made, the adjustment to living in close proximity with some one whose little daily habits of living are not known and which may possibly be annoying, the possible adjustment of one or the other to an entirely new circle of friends and relatives, or the adjustment of both to an entirely new place.

There may be the need on the part of the wife to adjust to household duties after having led a business or professional life as well as the need of adjusting to the fact that she is still of economic value even though she may not be an earning member of society. There may be the need of the young man to adjust to the burdens and responsibilities of a householder and the economic burden which accompanies the setting up of a household. There may be coal bills and plumbing bills and sundry other bills of which he never dreamed and which confront him for the first time in that first year of the new life.

Both have to give up a certain amount of independence and adjust to the needs and desires and tastes of another person, and unless there is a willingness to face the fact together and a readiness on the part of each to respect the rights of the other and not assert his own rights to the exclusion of another, the time of adjustment may become supremely hard and the attempt be given up as such a failure that divorce ensues. Divorce statistics for 1924 show that 38.9 per cent were granted to persons that had been married less than five years and that 12.3 per cent of the divorces were granted to persons who had been married one year or less. Obviously the first five years of married life represent a period when people are finding out whether they can adjust satisfactorily to each other or not and an increasing number of people are acknowledging themselves as failures in adjusting to the particular situation which they have created. Added to all these adjustments which must be made there is the need of both to adjust to the fact that there is to be a new member in their family who is going to absorb a great deal of time and who is going to require an entirely different mode of living from the one they are following. In addition there may possibly be need for the husband to

adjust to a sudden semi-invalid, and for the wife to adjust to the new physical sensations that she is having. All this conspires to produce a situation which is difficult and often extremely trying.

This may seem like a dark picture of the first year of married life but family histories bear out the fact that all these conditions may occur and that the test to which young people are put is often severe. A willingness to face these facts, a knowledge of how to face some of the situations by having been given previous important information and training, and an honest love for each other which has in it a spirit of cooperation and a sense of respect for the other's individuality, constitute an equipment for meeting the first year of married life with a high degree of success.

Adjustments to the First Baby.—*Financial Considerations.*—But whenever the first baby is coming whether in the first or a subsequent year, there are various changes which both husband and wife must be prepared to meet. Both must realize the importance of adequate care for the woman and the expense which it entails. There may be financial ability to secure one of the best specialists in obstetrics in their vicinity, or there may be the need to secure the best at the lowest possible cost. This may necessitate going to a special clinic for pregnant women thereby securing the services of well-trained physicians at little or no cost, and going into a hospital ward rather than to a private room when the baby is born. The important thing is for the husband and wife to choose wisely a physician whom they know is well trained especially in obstetrics if it is possible to obtain such a one.

The parents must, of course, plan for the baby in accordance with their pocketbook. In talking with their physician they must be quite frank and ascertain from him what his charges will be and if his charges are more than they can afford, say so frankly. There should be no sense of shame in saying that one cannot afford a certain charge, and one finds that the best physicians prefer this honest acknowledgment on the part of a patient. If the charge which an older man with long years of experience makes is too high, such a physician will refer the patient to a younger man who

though well trained has not had the experience which would warrant the higher fee of the older man.

It may be that the husband and wife in deciding to go to a specialist for care during pregnancy and the obstetrical period will have to withstand the prejudice of an older generation who considers such precautions and additional expense unnecessary, but they can fortify themselves with the facts and statistics which show that good prenatal and obstetrical care saves the lives of mothers and babies and that there is too a high percentage of deaths in this country because of lack of proper care.

Changes in Living Conditions.—It may be that the arrival of the new baby will necessitate a change in living because the present quarters seem too small to add a third person whose régime is to be so different from the régime of his parents. It is generally advised that a baby sleep in a room by himself if possible. In this way he can live according to his régime without interfering so much with the usual régime of the family. Their comings and goings will not break in upon his sleep, nor will the light which the parents want in their bedroom at night. He will be away from the noise which the older children will make, and he can live his peaceful life of eating, sleeping, and growing, especially during those first weeks under conditions which are conducive to such a régime. If the things needed for caring for the baby are kept in this room and if the bathroom is near by, the many necessary things which must be done for the baby can be done with the least degree of effort, an important consideration for a woman who may have many other household duties beside the care of the baby. If moving is to be done it should be planned with the advice of the physician at a time and in such a way as to avoid overfatigue for the wife.

Changes in Habits of Living.—It will be important for both husband and wife to realize that a baby will make a great difference in their household. They will not be free to come and go as independently as they have done. The night's sleep will probably be interrupted because the baby must be fed for a time once or twice during the night. Babies are bound to cry and it is right that they should, but it is

often hard for those whose ears are unaccustomed to the cries of little babies to accept those cries with the necessary philosophy. Fearful mothers or worried fathers can find their nerves sorely tried by the perfectly healthy cry of a baby.

That there are many adjustments to be made should in no way frighten people and make them look upon this period with dread. The preparation for the first baby should be one of such intense and mutual interest as to draw those two who are going through this experience together into a closer sympathy and understanding than they have before experienced. When, however, both husband and wife have in advance some realization of the difficulties which may be experienced they are better equipped to meet them successfully.

OBSTETRICAL PERIOD

The Advisability of Hospitalization.—In preparing for the birth of the baby one question which must always be decided is as to whether the baby is to be born at home or in a hospital. The tendency is for doctors to recommend hospitals if a good hospital is available, especially if it is a first baby or if there have been any symptoms of complications. The reasons for advising the hospital are: First, the hospital has absolutely all the equipment necessary for meeting any emergency which may arise; second, the hospital has additional trained people to call upon immediately in case they are needed; third, at the hospital there is every facility for giving the baby any special care it may need; fourth, at the hospital the woman will live a perfectly regular life during the postnatal period and will escape the consequences of any emergency which may arise in the home. One must bear in mind that the birth process must be looked upon as a surgical procedure the technic of which is similar to that practiced in a surgical operation. The hospital is prepared to make an aseptic delivery and thus to minimize the danger of complications due to infection.

The stay in the hospital need not be long, not more than a week sometimes, if the woman can go home in an ambu-

lance and stay in bed after she gets home. The hospital facilities are particularly valuable at the time of the birth of the baby and for the more or less critical first few days. The later part of convalescence can be taken care of satisfactorily at home. But good hospitals, although much more accessible than formerly, are not always available, and women sometimes feel that if there are other children they cannot make satisfactory arrangements for them while away from home. Much can be done, however, in the way of winning the children's cooperation. If a reasonably satisfactory arrangement can be made for their care, it is a good time for them to begin to learn to stand on their own feet and learn to live without their mother for a while.

If hospitalization is impossible one should get from one's physician a list of supplies essential to a successful confinement at home. Such equipment should be gathered together in one place about eight weeks before the baby is expected so as to be ready in case of a premature birth.

How to Compute the Birth Date.—For the full development of the fetus pregnancy must last approximately two hundred and eighty days (ten lunar or nine calendar months). Although for various reasons it is impossible to set the exact date for the expected birth an approximate date may be reached by counting back three months from the date of the beginning of the last menstruation and adding seven days. For example, if the last menstruation began on April 19th the birth date might be expected to be January 26th.

The Beginning of Labor.—After about nine months of uterine life the baby is ready to be born, which means that the uterine muscles must begin to contract at diminishing intervals until the baby is expelled, a process which is called labor. Just what excites these muscles to begin the necessary series of contractions is not known, and it is still a question for which the answer must be sought by further research. Suffice it to say, that, when the uterus begins these contractions the woman begins to feel labor pains, and she knows that her baby is about to be born. She should notify her doctor immediately. If the woman is to be at home, she should have the nurse with her, or if she is to go to the hos-

pital she will get directions from her physician as to when to go.

The Duration of Labor.—The duration of labor varies greatly from a very short time to thirty-six hours or longer, but as a general rule the first labor lasts longer than labors which follow. During the course of the labor, the neck of the uterus or cervix must stretch or dilate sufficiently to let the baby through into the vagina. The vagina, too, stretches from the small opening into a canal big enough for a baby to pass through; and the perineum, a triangular shaped muscle between the vagina and the anus, must also stretch as the baby's head presses down upon it. Skillful handling on the part of the physician does much to save the perineum from being badly torn. Sometimes the perineum will not stretch sufficiently and the physician may decide to cut it, rather than to let it tear. In either case the perineum should be repaired immediately after the birth of the baby without undue discomfort to the mother.

Stages of Labor.—Labor is divided into three stages. The first and longest is preparatory and lasts from the first sign of labor until the time when the cervix is completely dilated. The membrane or sac which contains the baby and the amniotic fluid ("water") usually ruptures at the end of the first stage. During the second stage the baby actually leaves the uterus and passes through the birth canal into the outside world. The third stage consists of a brief period of uterine contractions which serve to expel the placenta.

Position of the Baby.—The normal position of the baby in the uterus is such that the head will be born first. The proportions of a baby's body are very different from the proportions of an adult's body, the circumference of the head being slightly larger than the circumference of chest or abdomen. Hence, if the birth canal is large enough to let the baby's skull through, it is large enough to let the rest of the body through. One remarkable provision for facilitating the birth of the baby's head through the rigid pelvic opening is that it is not like an adult skull, which is absolutely rigid and impervious to outside pressure. The bones of the newborn baby's skull are not firmly united by osseous tissue;

instead the baby's head has spaces between the bones. This not only allows for the increase in the size of the brain which will take place especially in the first two years of life, but also permits of a certain amount of molding of the head by the overlapping of the bones as the baby goes through the birth process. This malleability of the skull which adapts it to the opening through which it must pass, frequently makes a newborn baby seem to have a queerly shaped head, a condition which might seem alarming unless one understood its cause and realized that within a short time the skull would assume its normal shape. On the top of the baby's head at the meeting of the frontal bone and the parietal bones there is an open space between the bones, almost an inch in diameter. This is called the anterior fontanel, which usually does not close until the baby is about eighteen months old. Late closing of this fontanel is in most instances an indication of rickets. At the meeting of the parietal bones with the occipital bone there is another and much smaller opening called the posterior fontanel which closes in about two months.

Twins.—Although women most frequently give birth to but one baby, twins occur about once in ninety pregnancies and triplets about once in seven thousand. Six is the largest number of simultaneous pregnancies on record. Identical twins are twins of the same sex who have developed from one ovum and one placenta. Twins of opposite sex must have developed from two ova ripened about the same time, each impregnated by a spermatozoon, and from two placentas; twins of the same sex may have developed from two ova instead of one. Biologically twins from two ova are not really twins but are two simultaneous pregnancies. Twins from two ova develop each in their own membranes, whereas twins from a single ovum are usually enclosed in one chorion.

Postpartum Care.—Following the birth of the baby, the mother goes through a period of what might be called restoration, when her body must undergo the changes which will bring it back to its prepregnant state with the exception of the establishment of lactation. After the exertion of what is rightly called labor, it is important that she have a period of rest; and as soon as she is made comfortable and the

physician has assured himself that there is no indication of hemorrhage, she should be left in quiet to get some sleep. For the following nine or ten days or longer she should remain quietly in bed. The usual aseptic precautions should be taken to prevent any infection. The breasts especially should be given attention, and the nipples kept scrupulously clean.

The woman who can be given some assistance in the care of her baby for six weeks is having the chance of going through practically the whole puerperal period with adequate help. At the end of four or six weeks, the examination made by the physician should indicate whether or not her uterus has returned to its normal state and position, and if this is not the case, treatment can be instituted at that time to correct any condition which is not satisfactory.

SUGGESTED QUESTIONS

1. Why is good prenatal and obstetrical care important?
2. What constitutes an adequate diet for a pregnant woman? State the opinion of several authorities in medicine.
3. What may be the results of an inadequate supply of calcium, of phosphorus, of iron, and of iodine? How can these be provided in the daily menu?
4. Discuss other important considerations in the care of a pregnant woman.
5. What are some of the most important family adjustments which must be made in preparation for a new baby?

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CHAPTER IX

THE HOME AND FAMILY AS A BACKGROUND FOR GROWTH

THE IMPORTANCE OF THE FAMILY AS A SOCIAL INSTITUTION

Family Life Universal.—It is probable that most of us spend a large share of our lives in families. We are born into families and live in families and, if through some untoward circumstance that family is broken up, we tend to attach ourselves to some other family or build up some artificially formed group which we incorrectly but wistfully term "our family." Although the economically independent single woman today is often found in the large cities living in clubs or apartment hotels, the tendency still seems to be to form small groups and set up some form of cooperative family living with its attendant responsibilities as well as its attendant compensations. We live in families if we can and we would die in families. The old, wherever they may be, whether living alone in the shell which once housed their family, or in some place far removed from it, whether in the home of some relative or in the home built for aged which must spell itself in capital letters HOME, cling to the material evidences that they, too, were once part of a family and treasure their various reminders of the family life that has gone.

The Emphasis in Social Work on the Importance of Family Life.—Society in its social work today places the emphasis on family life in some form, and tends to board the children who for one reason or another have been deprived of their own families, with other families instead of putting them into the old time institution which made much of the word Home in their title and little of the word family. In 1909 the first White House Conference expressed itself in the resolutions adopted as believing in "the conservation of family home life as 'the highest and finest product of civilization,'

not to be broken for reasons of poverty, but only for considerations of inefficiency and immorality." It also gave "an emphatic endorsement of the doctrine that 'the carefully selected foster home is for the normal child the best substitute for the natural home.'" At the third White House Conference in 1930 the third clause of the Children's Charter is as follows: "For every child a home and that love and security which a home provides; and for that child who must receive foster care, the nearest substitute for his own home." In fact the whole conference was permeated with the conviction of the importance of satisfactory home life for the child and the necessity for education of individuals to prepare them for parenthood.

The old time institution itself has been affected by this reemphasis on family life. Large groups of children regimented in dormitories, regimented in dining halls, clothed exactly alike in dull and shapeless clothes are fortunately less often seen than formerly. The institution is seeking to duplicate family life insofar as it is possible. The children under its care, separated into smaller groups more nearly comparable to the family group, live in cottages, where with varying degrees of success there is at least an attempt to provide a home atmosphere.

There is even a movement on foot today to do this same sort of thing for the aged, and to find families with which they may live in preference to institutional life. That is to say we look upon the family, not merely as a biological unit which provides population, but we look upon it as having certain values in the development of the individual which are of such extreme importance to him that every effort must be made to provide those values. The family has importance as a social, economic, and educational unit. Even when the biological family fails completely as a social, economic, or educational unit, we still consider family life so important that, although we must break up the biological family, we look to other families to carry on in the other functions so necessary for the child.

Why this emphasis on family life? What is the family, why is the family, and why is it good? Not all consider it

good, and in truth in many instances it is bad. But individual failures in family life do not necessarily mean that the institution itself is at fault although some of the more radically minded say that it is a worn-out institution and that it must pass. But the balance of evidence would seem to indicate that society has found it a satisfactory institution (it has certainly stood the test of time), and that in its finest and most democratic expression today it is better than ever before. Nevertheless, the family as an institution cannot ignore its critics of today; it cannot remain as it has been, but must change to meet the needs of modern life. Growth and development are characteristics of life and the family as a living thing must manifest those characteristics. It must discard age-old customs and attitudes if, in the light of critical analysis, they are found incompatible with the civilization of today.

The Origin of the Family.—The family is the oldest of our social institutions, and is deeply entrenched in society in spite of all its critics may say. Students of primitive society tell us that the institution of marriage is rooted in the family and not the family in marriage as one might suppose from the chronological order in which they now appear. Marriage, even without the legal or religious connotation of today, in its fundamental meaning is understood to be the more or less permanent union which is maintained between male and female and which seems to have developed permanency because of the cooperation in caring for helpless offspring. Marriage is not an institution peculiar to man alone, but is found even in permanent form among certain mammals and birds where the habit of cooperating in life activities has become established and has affected both members of the union to such a degree that they become mutually dependent and choose to continue to live together.

It was not necessary to develop marriage for the satisfaction of sexual desire, a transitory and recurrent thing. It was necessary, however, to care for the child during the period of his helplessness. Thus the two individuals of whom that child was a part developed the habit of living together in order to care for that which, at least biologically, was

jointly theirs. In this living together and assuming a joint responsibility they evidently found a satisfaction and an incentive to effort that did much to establish the permanency of the family. Part of the instinct for race preservation appears to be an instinct for nurture which is common to all those forms of life where the offspring has a period of helplessness, for unless cared for, the offspring will die, and the instinct for race preservation will be thwarted. When this instinct for nurture is felt jointly and when family life is maintained we have the institution of marriage. The child, therefore, has been the preeminent factor in establishing the family, and the family, not marriage, is the basic institution.

The Biological Importance of the Family.—Biologically the family has been important because it has provided population. The quantity and quality of posterity has been determined by families. Statistics show that children born of a transitory sex experience where there is no thought of establishing family life, have less chance of living than have the offspring of those who have proclaimed their intention of living together. In other words the mortality rate for babies of illegitimate birth has been found in various studies to be from two to three times as high as the death rate for babies of legitimate birth.

The Economic Importance of the Family.—Economically the family has been so important a unit that some people claim that it is because of its economic importance that it has endured as an institution. Until the development of machinery ushered in the industrial age the family was the great productive unit as well as a unit for consumption. The family has held the land and other forms of property, and through its hands property has passed from one generation to another. The state up to the present has protected that right although what the future may say in regard to the passing on of property seems less sure than in the past. The state is certainly reaching out to take more of a share from family estates than formerly and it is not inconceivable to think of a time when the state will no longer acknowledge the right of an individual to inherit a great property or possibly even amass it. For the present, however, the family

must still be considered an important economic unit because of its control of property. The family has not only been important economically because it has been a producing unit and has controlled property but because it has been the great motivating force which has incited man to work. The family has also been, particularly in the past, a strong force influencing the type of work undertaken by the sons of the next generation. It has likewise cared for the dependent, the children, the sick, the elderly, and because of these functions has been of economic value.

Today the family seems to be less important economically in that it is no longer the great producing group. The fact that it has ceased to be a factor in production means that much of the work that woman did in the home has passed into other hands. When production was on such a scale that it called for the help of many who worked under the direction of the woman in the home, it called for a display of considerable executive ability. Under such conditions a woman, even though in her own home, was a producer of goods and therefore had the economic value and the satisfaction in production which a producer has. Today her economic value in the home may be found in her ability to handle expenditures well, but her function as a producer of goods in the home as well as her satisfaction in this activity are largely gone. The bakery, the cannery, the mill do for the mass what woman used to do for her family.

It was to be expected that as some of her work left the home, woman should follow and take her place as a wage earner in the industrial world. No longer a producer of commodities at home her economic value was somewhat reduced. Consequently in those homes where the woman's economic contribution was essential she had necessarily to contribute that economic support by becoming a wage earner.

To other women the loss of work in the home meant that her one time hours of industry seemed to be left unfilled. No economic pressure forced her to follow the work outside the home and the Penelope who had directed the work of her handmaidens found herself for a time without outlet for her abilities. The adjustment which such a change in family ac-

tivities called for has been a difficult one to make for many reasons. But it is important to bear in mind that the loss of the home's importance as a productive unit with the accompanying necessity of woman's adjustment to this loss has had a far-reaching effect upon the status of women, a subject which will be discussed in more detail later.

The Social and Educational Importance of the Family.—

The close relationship between parents and children and between one child and another during the formative years has made the family an educational and social unit, the importance of which can hardly be overestimated. So great has been family influence on the child that it has sometimes led us into the mistake of crediting or accusing heredity of giving to a child a trait or characteristic which in many instances has been the result of the influences playing upon the child since birth. Throughout the ages this powerful institution the family has maintained itself in one form or another, but in whatever form it has always implied at least two generations living together and therefore the core of the family has been the relationship of parents and children. The very basis of family life is social.

The word family has been given various interpretations. To some it has meant a broad, a sometimes vague term including blood ties of various degrees of strength on one side of the family or another. Usually the emphasis has been on the paternal relatives of the same name, although there have been societies in which the family group has been centered around the maternal relatives. To others it has meant the group of two or even more generations living under one roof and has, especially in older civilizations, included those who served the household as well as those held together by ties of blood. But wherever it has been and whatever its form there has been the child. The child makes the family and the family is the institution in which we have chosen and evidently still choose to have the child spend most of his childhood. What the child learns, what his emotional and social development may be, what attitudes toward life he will have still seem to depend to a great extent on what his family is.

It is true, however, that the family is no longer serving so

completely as the institution which is to meet all of the child's educational and social needs. The school takes him for part of the time at an earlier and earlier age;* camps during the holidays take an increasing number of children.† Children of divorced parents are in some instances living what might be called a split family life with the possibility of an attendant stress and strain, but even with the supplementing and change children are still living in families and the stamp of approval, although perhaps not so firmly attached as formerly, is nevertheless still set by state, church, and society on family life.

The Necessity for Study of the Family Because of its Importance.—It is perhaps curious that such an old institution with which we have been so intimately connected has for so long failed to catch the attention of students of social institutions, and has gone its own way until fairly recently without arousing anyone to an intensive study of its history, development, meaning or purpose. The very fact, however, of its nearness to us and our intimate connection with it, has perhaps made us take it for granted and feel little concerned about trying to trace and understand its development as we have various other of our institutions. But the family is at last claiming our attention. Scholars are giving us the results of their study and research on the various aspects of the family, and the general public is looking at the family with an intelligent and critical interest which it has not had heretofore. An indication of this is the large amount of space now given to the family in current magazines. What the family has done and why it has done it are becoming increasingly important to us for we are realizing what a powerful factor biologically, economically, physically, educationally, socially, and religiously it has been in the history of the world, and we know that we must understand it if we are to use it intelligently and if we are to modify it or change it in the interest of social progress.

* Nursery schools which have been developing in this country during the past fifteen years and which had their beginning in England are taking children at eighteen months for from three to six hours during the day.

† Private camps, Scout camps and camps run by other organizations, have sprung up in great numbers in recent years.

Necessity for Study Without Emotional Bias.—Everyone of us has had some connection with a family. When we are scrutinizing the family, therefore, we are looking at something of which we are a part, and it is inevitable that anything of which we are or have been a part involves our emotions. It behooves us, therefore, in scrutinizing this institution, the family, to bear this fact in mind, and to be watchful of our emotional bias lest it betray us into wholesale commendation of the family as it has been and always should be, or into wholesale condemnation of it as an institution which has outlived its usefulness and must go. Perhaps among students there is little likelihood of wholesale commendation of the family as it has been, although it is easy to commend wholeheartedly some particular phase of family life which is dear to our heart. We must remember that it is old, with an age that no other institution has, that living things which are old are not malleable as youth is malleable but that this does not mean that it has no capacity for change. It will change if the pressure brought to bear upon it has the weight of seasoned opinion and is not the snap judgment of intolerance. We must remember that all that is old is not necessarily worthless, but at the same time we must remember that some things that are old have, in truth, outlived their usefulness and should therefore be discarded.

CHANGES TAKING PLACE IN THE FAMILY

Modification of Patriarchal Type.—For a long time in the history of our civilization the patriarchal type of family has been the predominating type. Our laws and customs have grown up around the idea of the family as a social unit in which the father has been the supreme being, religiously, economically, and governmentally. Time and place have made some difference in the amount of power accorded him, but the family has remained patriarchal. The father has held the reigns of power in his hand. Today, however, this is less universally so, and the signs of the times indicate that the patriarchal type of family must be and is being greatly modified. Some people predict that it will disappear.

The family is certainly changing; perhaps in the last two

generations it has changed more rapidly than it has in centuries before. The law in the United States and in other countries as well no longer consistently grants the father complete ownership of his family. No longer is his word law without question on economic, religious, and governmental matters of the household. The state long since in so-called "civilized countries" took from the father the right to say whether or not the child should live. It says today, although far from universally and in varying degrees of force, that the child shall be cared for and not abused, that he shall be educated, that he shall labor only under certain conditions, and that the mother as well as the father, shall have certain rights of guardianship.

The patriarchal type of family is still in our midst, however. There are plenty of evidences of this, and we should not necessarily wish to abolish every evidence of it simply because we are attempting to greatly modify it. Legally wives still take the surnames of their husbands when they marry, and children bear the father's name. It is the man who gives the family name, not the woman. Wives are today in some instances, especially when embarked upon a career, choosing to carry on under what they call their own name, but they must remember when they are insisting upon doing this that they are in reality bearing their father's name and are therefore merely identifying themselves with their father rather than with their husband. They are not altering the fact that the man stamps his name on the family.

Our laws still look upon the man as the one who is responsible for the support of his family, and in divorce the wife, not the husband, is granted alimony—a situation which obviously needs reviewing in these days of childless marriages and woman's economic freedom. Added power for the woman should mean added responsibility, and therefore in the modification of the patriarchal type of family woman must realize that in the reallocation of power she will inevitably have new responsibilities with her freedom. It would seem as if the aims should be, not so much for a shifting of power, as for a joint assumption of responsibility with an allocation by mutual consent of certain functions to the one in the partnership best fitted to assume them. In the purely patriarchal

type of family this mutual division of responsibility does not exist. The power is in the hands of the man, the state so recognizes it, and woman's function is to carry out whatever duty man imposes upon her. Whatever power she has had, and it must not be denied that woman has had power even in the patriarchal family, she has had to wield subtly, exercising her wiles to get that which no law recognized as hers by right.

Changes in Status of Woman and its Effect on Family.—

The patriarchal type of family in its extreme form is passing, even though there are many vestiges of it in the type of family which is now emerging. Various factors have brought about these changes in the family. Changes in industrial conditions and the increased economic and educational advantages open to women have made it unthinkable that she should continue to be as she was in the past without legal status of her own and under the complete domination of the male head of the household, without property rights, and without guardianship rights over her children. Changes in the divorce laws have followed the recognition of the rights of women, and with these changes marriage has become a less permanent thing than it was in the days when women were without the educational equipment which might make them economically independent.

Women Who Work and Their Reasons for Working.—The educational advantages open to women today have widened their vision and opened up many paths of work hitherto unknown to them. Women are today in business and professions as never before. The "women who work" (a phrase which amusingly is used in such a way that it excludes the woman at home—as if she did not work!) are found not only among those women who are compelled to work in order to feed hungry mouths, but are found also in all other classes. In some cases they represent women who desire to pursue their profession or their business even though married or perhaps instead of marriage. If married they may choose the pursuit of their profession or business instead of children, or they may attempt all three—marriage, children, and a business or professional career. If a woman is attempting the latter it may be that she chooses to go on with her work in order to maintain a certain standard of living to which she has become accustomed and

which she feels is essential. There are standards for maintaining health, standards of education, standards in the cultural life that a woman and her husband as well may feel must be maintained not only for themselves but for their children. Yet, the maintaining of those standards may place an economic burden upon the husband which is more than he can carry. The wife, equipped with the education which has made her economically independent in the business or professional world, and realizing that in this modern industrial age certain functions have been removed from the home, decides that she wishes to continue in her earning capacity with the exception of such time as she must miss because of childbearing. Such women assume part of the economic burden and are indeed partners of their husbands in this family function.

Some women, because of the pleasure found in the work itself and because they feel adequate in the business situation and inadequate or almost helpless in the home situation, choose to continue with their work. There are women who frankly acknowledge that although biologically mothers they are not in other ways fitted to be mothers. They say that they are more successful in business, that household care and the care of children irk them, and that they prefer to work and pay someone else for taking care of their children. Possibly such women may be right. Grant that they may not be temperamentally fitted to carry on this important function of giving children the right start in the world from a physical, mental, social, and spiritual point of view, they must, nevertheless, recognize this aspect of motherhood as an important function—one which calls for skill of the highest type. They must not think that a little supervision from mother night and morning with hours of the day under the care of an untrained maid will suffice. Crises with children may arise at any time during the day, and they call for intelligence and wisdom of a high order if they are to be met in such a way that the child is not harmed. Women who do not wish to assume the care of their own children must look to those who have undertaken the care of children as a profession to "carry on" for them. This function if they do not assume it themselves they must be willing to pay for on a professional basis. They must also be will-

ing to accept the possibility of the children, during early childhood at least, turning for comfort and succor when needed to the one who gives them care and therefore a sense of security.

Economic Value of the Woman as Home-maker.—If the woman is continuing in business solely for economic reasons she must bear in mind the fact when making her decision that if she were to give her attention to the management of her home she would have an economic value even though it would not be expressed immediately in dollars and cents. The woman as the one in charge of the spending of money has an economic value as well as the person responsible for securing the income. The home which is economically run, where the money is wisely spent is the home where one usually finds some one person in charge of this matter. Buying in such homes is not done in a hit or miss manner, but is the result of careful consideration on the part of some one individual. Waste and unnecessary repair are avoided because there is someone in charge who feels a responsibility for such matters. In spite of the many changes that have taken place in the home the woman still has an economic value as the one in charge of the household. It is often hard, nevertheless, for the woman who has received her weekly or monthly check for services rendered, to appreciate an economic worth which expresses itself in less concrete form than the monthly check; women are often reluctant to give up the satisfaction found in actually earning their own money.

Family Adjustments When Woman Works.—Many interesting questions arise out of this modern condition of the earning woman. For example one finds today some of the women, who in years past, assumed part of the economic burden of the family raising the question as to whether or not they merely relieved their husbands of part of their responsibility thereby depriving them of a valuable element in their incentive for effort. And again, if, because of economic reasons the woman does assume part of the financial burden shall she still carry the home burden if she cannot afford adequate help as she did? It is true that some of her home burdens have been lightened by the bakery, the laundry, the cannery, and other industries; but there are still many duties to be performed at home, espe-

cially if there are children. If she is her husband's partner in carrying the financial burden may he not be her partner in some of the home duties and share with her in the care of the children? Should he not learn about baby feeding and some of the other aspects of child care as well as his wife? Is there any reason why he should not help in the care of the sick child if his wife is carrying as heavy a work program as he is? If the husband is indeed to share with his wife in the training of the children should he not as well as she know something about what the care and training of children mean?

Finances.—Another question which arises when women work and in fact which arises in many modern families when the struggle is for a more democratic form of family life, is the question of finances. In the patriarchal home there was no question about the matter. The man held the purse string and women submitted even to having their fortunes pass into the complete control of their husbands. This is not so today. The law has accorded women certain property rights, and woman does not submit so readily today to what she considers the humiliating situation of having to ask her husband for money from time to time as she needs it. If she is of value in the family situation even though not contributing actual money there should be some recognition of the fact.

There are various ways in which families meet this problem of finances, and there are many instances where it has not been met satisfactorily and thus remains a source of irritation and friction. Sometimes there is a household allowance, sometimes a joint account, and sometimes other arrangements are made. The point that must be borne in mind is that the question of family finances is an ever-present one, and deserves the thoughtful, honest, fair-minded consideration of husband and wife if the family is to break away from the patriarchal practice in this matter. One phase of the question must be viewed with fair-mindedness especially by the woman. Woman is so new a comer in the business world and her experience there has been so much more as an unmarried woman than as a married one, that she may easily look upon her earnings as peculiarly her own and not belonging to the family pocketbook. Man has for so long been the earning member of the family

which he establishes that he feels it is his burden to carry the household finances, and he may look upon his wife's earnings as something belonging to her for her clothes, her vacation, her particular pleasures. Such an attitude on the part of husband and wife is not in reality a partnership attitude and may give rise to a situation in the family which is far from democratic. From this it is again evident that it is not an easy matter to slough off patriarchal traditions and practices and to make the family in reality the democratic institution which it seems to be striving to become.

Instability of Family as Evidenced by Divorce.—The family is indeed going through a greater period of transition than it has ever before experienced, and like all things which are changing rapidly its weaknesses and failures are coming to the surface and are easily discovered in the light of the critical attention which students are today giving this age-old institution. It is no longer the stable institution it was in the days when complete authority rested in the husband and father and when conditions were such that life was more centered within the family. It is breaking down more frequently, and the rising tide of divorce is looked upon, especially by those who consider marriage a sacrament, as a serious menace and an indication of the evil effect of modern conditions upon family life. To these critics divorce is a disease and in its modern aspect a very serious disease. To others, however, this rising tide of divorce is a symptom of a disease that has existed a long time—an outbreak against intolerable family situations which women and children are no longer called upon to endure. Statistics would indicate that it is something of both. In so far as it indicates an impatience and unwillingness to make the effort to adjust to married life, it is perhaps a modern disease, the undesirable by-product of the modern cry for the rights of the individual without due consideration to the rights of the other individual. In so far as divorce is a symptom that the family is going through a process of change from the patriarchal to the democratic type of family, it is merely a symptom of the canker which has been for long at the heart of the patriarchal family.

FAMILY'S IMPORTANCE TODAY ITS CONTRIBUTION TO THE DEVELOPMENT OF THE INDIVIDUAL

The Family's Importance *versus* the Individual's Importance.—The family up to the present has in reality been the supreme thing. Individuals have been sacrificed to the institution of the family. For example, the inheritance of the bulk of the property by the oldest son often meant the sacrifice of the other members of the family. But the important thing was the carrying on of the family name, the perpetuation of the family as a social force, the maintaining of the family as an important economic unit. The family as a strong unit in society was the end and that individuals might sometimes have to be sacrificed to that end was not then considered important. In these days of individualism, however, the family *per se* is not considered important. If it is important it is important because of what it can do for the individual, and therefore it becomes a means and not an end in itself. The optimum growth of the individual is the end, and in so far as the family may be a means of promoting that growth it is good.

In the days when the family was the important unit and not the individual, the patriarchal form of government was particularly fitted to promote the family institution. But in these days when individualism is the cry, complete paternal authority in the family can no longer exist. In those days too the large family would naturally be the rule for it was then considered that the family must be powerful as a populating force as well as an economic force and must run no chance of weakening as a family. When the family itself ceases to be the end and becomes the means it no longer has the same stimulus to populate the earth that it did have, and smaller families where each individual is to be given his fair chance become the rule. The number of children in the family is no longer looked upon so universally as a matter entirely outside man's right of decision, dependent only upon the chances of nature. Instead, the claim is made that it is right that the number of children in a family should, in so far as is possible, be a matter of decision on the part of husband and wife.

Reasons For and Against Regulation of the Size of the Family.—It is coming to be felt that in mankind the sex im-

pulse exists not only for the purpose of procreation, but also for the enriching of life together in its social and spiritual aspects. Therefore it is coming to be felt that the gratification of the sex impulse may be sought not only for the purpose of perpetuating the species, but to serve a spiritual purpose as well. In other words it places the sex act in man on a higher, not a lower plane than in animals when it conceives that it may be indulged in for other reasons than propagation. The modern viewpoint claims that children have the right to be wanted, the right to the fairer chance which regulating the size of the family to a number which can be adequately cared for would seem to give them, and that it is right to make use of scientific knowledge to limit the size of the family. Scientific knowledge is used to prolong life, to save life, or even to increase the size of the family, for it must be borne in mind that the problem for some people is not that of limiting the size of the family but of having children. Science has helped in this problem as well as in its opposite. It is in the factors which influence the decision of the husband and wife as to the size of their families that certain dangers lie. If those who seem to have a "goodly heritage" to pass on and who could give a child the right environment, choose for selfish reasons to have no children or to have only one or two, and if those who are less fit populate the earth, the outlook for civilization does not seem promising. Decisions made for selfish motives without willingness to make personal sacrifice for the sake of children, without an appreciation for the needs of the race and one's responsibility for the future, are the types of decision which make one hesitate about the wisdom of giving information as to the methods to be used for limiting the size of the family.

Family a Negation of Supreme Individualism.—It is well to remember in these days when the rights of the individual are being so loudly acclaimed that the family is in reality a negation of supreme individualism. Male and female are interdependent for the function of reproduction. They can each grow, think, carry on their business careers separately, and die separately, but if they would have complete and normal sex expression and would react to the instinct for race preservation

they are not self-sufficient individuals but must each find a mate. The offspring are helpless and therefore, at birth and for a long time, must continue to be dependent, at least in part, developing comparatively slowly as independent individuals until they, too, even though they have been allowed every opportunity for developing as individuals, find that if they in turn would reproduce they must each find a mate.

Man's Need as a Social Being of Family Life.—Man does not live to himself alone. He seeks companions, and if he would live successfully with others he must be able to so modify his individuality that it can fit into the group of other individuals without calling upon any one individual to make too great a sacrifice. The family unit would seem to be the means whereby the individual can acquire this power. The family must allow freedom for personal development and yet must equip the individual with the brakes which respect for the rights of others, loyalty toward something outside himself, and love will put upon his actions. Such brakes need not be looked upon as devices whereby his individualism is inhibited, but as means which are under his own control and by which he may maintain himself in a normal state of growth and thus avoid an overgrowth of individualism.

Family Particularly Valuable For Individual and Social Growth.—Myerson¹⁰⁰ in his book on *The Psychology of Mental Disorders* says: "Family life must be made up of at least two components, first, guidance and discipline, so as to bring into the child's life early the experience in customs and morals of his group, and secondly, freedom and individuality growth, so that his own natural tendencies in so far as they are good, may grow in order that he may learn to express his own will without too great a dominance on the part of his elders." The family today in its finest expression is probably a finer achievement than ever before, for it is a group in which children guided by the mutual cooperation and understanding of *both* parents are allowed freedom for self-expression and yet are given the opportunity to learn those lessons in human relationships which make for satisfactory living with others and which the family group seems to be especially qualified to give.

When the desire for self-expression on the part of one clashes with the desire for expression on the part of another trouble will ensue until those individuals have learned something of justice, of respect for the rights of others, of kindness, sympathy, and understanding, and by learning have found satisfaction in the give as well as the take of life. Such lessons one finds that children may begin to learn in babyhood from the intimate family circle in which they have lived the first months and years of their lives. The impressionable child, sensitized by the love element found as part of the environment in wholesome family life, acquires many things through imitation of those around him, possibly a characteristic gesture of hand or head, and equally possibly such fundamental attitudes as those toward himself, his God, and his fellow men which may become part of him for life. It is easy to lay certain traits in children to heredity; it is much less easy to face the fact that one's own daily example may be the cause of the child's attitude toward food or his selfishness with his playmates or his rebellion against authority. May not the thoughtless but scathing criticism uttered within the family circle of a neighbor who is met with honeyed and flattering words be an easy lesson in insincerity and intolerance which bears its mark in later life? Are religious and race prejudices and many other prejudices acquired as the result of one's own experience in life, or are they rather handed down from generation to generation not as a biological inheritance but as an attitude acquired in early life by imitation of some member of the family? Is any other institution a greater pattern maker than the family? It is well to remember that the lessons learned from the family may not be, in fact often are not, desirable lessons, but one does not because of this condemn the institution of the family. The family is a power in the life of the child. Whether it be a power for good or for bad rests with the individuals who comprise that family.

The child may have lived in a family where such virtues as kindness, tolerance, respect, and loyalty have not been practiced, and one may find even in the two-year-old child the beginning of a ruthlessness and a disregard for the rights of others which does not augur well for satisfactory social well-

being. Reports on studies of juvenile delinquents and unmarried mothers bear out one's belief in the importance of the family in the development of the child. There one gets the adverse side of the picture and finds bad home conditions in a high percentage of cases as a factor influencing behavior.

Healy and Bronner^{60a} found that "among 2000 young repeated offenders there were living under reasonably good conditions for the upbringing of a child, only 7.6 per cent. . . . Where to place a large measure of responsibility, where to direct a strong attack in treatment and for prevention of delinquency stands out with striking clearness."*

The Children's Bureau^{28a} in a study of illegitimacy records, "Conditions in the mothers' parental homes were far from desirable, for in only 21 per cent of the cases in which information was given on this point were the mothers' parents of good character, normal mentality and normal status, both parents present in the home." It states further, "Especially has it been shown that most of them lacked normal homes, of the type in which wise parents share their children's lives and experiences and guide them tactfully into proper activities."

Family Represents Both Heredity and Environment to Child.—The family is a powerful influence in the life of the child because it represents both heredity and environment, and no matter what stand one takes in regard to the importance of one or the other the family gives both to the child. Granted that the child may be born with the bud of certain inherited personality traits, the force of environment largely represented by home and family during the early and impressionable years begins immediately to make itself felt, influencing the growth and development of that personality. It must be born in him too that the family gives to each child a different inheritance, except probably in the case of identical twins. It likewise gives a different environment to each child, for no child comes into a family exactly like the family into which the former child came and no two children are treated exactly alike. It must not be wondered at, therefore, that children in the same family are different.

* From Healy and Bronner, *"Delinquents and Criminals, Their Making and Unmaking"* (1926), p. 129. By permission of The Macmillan Company.

If the family is so important a factor in the child's life it is well to think of how it may help the child to grow satisfactorily, physically, mentally, and socially, for one would hardly deny that the opportunity for satisfactory growth is the opportunity which we would wish to give children. The family provides the economic, the physical, and the social setting for the children in whole or in part during the growing and impressionable years.

REQUISITES FOR SATISFACTORY FAMILY LIFE

The Importance of Marriage as a Basis.—From the viewpoint of the child's benefit, and it is from that viewpoint that we are regarding the family institution today when we are thinking of it as a means whereby individual growth is to be fostered, the question of marriage becomes a very important matter. The institution of marriage is going through a transition even as the institution of the family. The original meaning of marriage is found in the family, that is, in the parent-child relationship; but we are far removed from the origin of marriage and there is no reason to expect that while man has developed through the ages marriage should have remained an unchanged institution. It must needs change to meet man's development. Marriage which was originally an individual matter eventually became the concern of church and state both setting up certain regulations in regard to it and decreeing that it should take place before the founding of the family if the child is to have recognition as a member of the family. It is conceivable that one might contend that at that very point the mistake was made; possibly the union of man and woman should not be called marriage until there are children for whom they are mutually responsible. Man has made of marriage a social and spiritual matter through which he has sought to satisfy something far beyond a biological need. Marriage today will not be undertaken for the same reasons that it was undertaken in primitive society. It has taken on new meanings and must be judged in a different light.

The marriage of today which is undertaken by two individuals for their own personal desires because of a mutual attraction—love, desire for companionship and delight in each other, perhaps with the definite understanding that there will be no

children at least for some time, is far removed from marriage in a primitive sense or from marriage as understood under the rigid patriarchal system of family life. There are not the same basic reasons for permanency or for the support of wife by husband in marriage under such conditions, as when husband and wife are bound together by the mutual responsibility of caring for children. When there are children whose periods of dependence overlap the husband assumes or should assume as his share of the burden the support of the wife during the time when she is bearing as well as caring for the children.

The Requirements of Marriage Today.—The demand is made of marriage today that it shall be mutually satisfying to the husband and wife whether they be parents or not, and that if they are parents there shall be other satisfactions as well as the satisfaction of parenthood. In the days when the family was considered the important institution which individuals worked to serve rather than to be served by, families arranged marriages, having in mind the good of the family rather than of the individual. But when the individual began to come out from under complete family domination both man and woman demanded the right to make their own decision or choice as to a mate. Family needs affected them less and personal desires more.

The right of a responsible individual to choose one who, it is hoped, shall be a life partner one hardly questions in this day and generation. But it is equally evident that individuals should be given some standards for choice which may possibly save them from rushing into a marriage with someone for whom they feel a temporary attraction and with whom there is little chance for forming a successful partnership for their own satisfaction or for the rearing of children. So strongly entrenched in our thinking has been the attitude that the choice of a mate was either a family matter or an individual one, that states have been very slow to promote any legislation which would limit the right of free, individual choice. Such attempts as have been made to so legislate have been directed against the young, physically unfit, and those of such low grade mentality that they are dependent upon society. Even though marriage has been called a sacrament by the church it can still

as a rule be entered into without preparation with the greatest ease by people who are doomed to make a failure of it. The question rises: How can we insure a greater number of successes in marriage? Can we in any way regulate marriage so that it may in truth become a sacrament?

Marriages which are successful do not end in divorce, for divorce is an acknowledgment of failure. Anything that is done to make marriage a success will therefore reduce the number of divorces. It is interesting to note that the usual attitude of any one starting upon a life career is that he is determined to make a success of it. Failure in it is likely to be considered something of a disgrace, and one hesitates to acknowledge failure in a career until one has made a mighty effort to achieve success. One does not find the same attitude prevalent toward the career of marriage. Groves⁵³ says, "It has become characteristic of our time not only to enter marriage under the spell of pleasure motives, but also to retreat from it just as soon as it ceases to advance happiness." This attitude toward marriage is an inevitable result of the claim on the part of the individual for a right to happiness, without a realization of the individual's responsibility to attain that happiness through his own striving toward a goal. There is today little if any feeling of disgrace when one has failed in marriage. The divorce after all is not the disgrace it used to be considered. One may call that a frank acknowledgment of failure. The disgrace lies rather in the fact that two grown people who, in this age, are supposed to have received at least a fair amount of education, have entered upon marriage without preparation or without having had developed within them an attitude toward marriage which would insure a chance, at least, of success.

The Necessity for Standards and Effort to Make Marriage a Success.—Marriage is such a personal affair, so dependent for success on the adjustment sexually, emotionally, intellectually, and, one may also say, practically (for every day living together assumes a very practical and oftentimes humdrum aspect), that it is no easy matter to attain success. Certainly success will not be obtained without definitely striving for it. It is well to remember, however, that success through effort is often the sweetest, and that there are many successful marriages today in spite of all the difficulties involved.

The question arises: Are these successful marriages to be just lucky chances or can we in some way insure more successes? It rests with the individuals. To be emotionally and sexually compatible, to supplement each other, and to be a stimulus to each other so that each one reaches a higher level of development because of marriage, to find with each other the satisfying companionship which means that pleasures are enhanced and burdens lightened by sharing them, all these things make marriage an experience which one supremely desires may be a lasting one. It would seem, then, that a marriage based upon a love which had in it not only mutual attraction and sex urge but also elements of unselfishness and willingness to adapt to another as well as elements which make for truly satisfactory companionship, had in it those elements which modern marriage requires. The purely romantic idea of marriage to which so many people have been exposed has not been a sound social basis upon which to build, since it presents marriage as a rosy state of love and happiness to be embarked upon without any thought of the effort which each partner must make to insure success or of the change which each will inevitably undergo. If, in addition to the mutual satisfaction found in each other, the husband and wife desire children and are prepared to assume an intelligent responsibility toward helping those children obtain satisfactory growth, we have a marriage which has laid the cornerstone for successful family life.

Physical Requisites for the Home.—Granted that such a cornerstone for successful family life has been laid by a satisfactory marriage. What then should be provided as the physical, economic, and social setting for the child in order that he may have the opportunity we desire for him? The economic condition must necessarily impose limitations on the physical setting, but there are certain fundamental physical requisites which must be provided in one way or another in the child's environment if he is to be given his rightful opportunity. Physicians and psychologists tell us that we all, and children especially, need sunshine, fresh air, relaxation, rest, sleep, and exercise. The right kind of food which includes a safe milk supply and a pure water supply, and a satisfactory system

of sanitation and protection against disease should be provided, not only for physical well-being, but also for emotional and social well-being.

Some of these the community, in reality largely an aggregation of families and therefore with a family consciousness, provides. One finds that within the last thirty years especially, through various public health measures, more and more communities have secured for themselves proper sanitary conditions, a safe milk and food supply, a pure water supply and protection against the spread of communicable diseases. All families in the community, whatever their economic condition, have shared in these benefits. There are still other physical requisites, however, which are left to the individual family to provide; and it depends on the intelligence and economic condition of the family as to the extent to which they will be provided. The responsibility belongs primarily to the parents. They will choose their home, their milk man, and the food they are to eat; they may choose intelligently with thought for the physical needs of the children, or blindly without due consideration for these needs, being blind often not because they choose to be blind, but because they have not had their eyes opened. If the community insures good sanitary conditions and a pure water supply, the parents will not have a responsibility in regard to them, beyond assuring themselves that these essentials are provided.

Shelter.—The economic condition, the place of business of the important earning member of the family, and the educational and social opportunities in the neighborhood necessarily influence and limit the choice of location of the home. That the family must have shelter is so obvious that one hardly remembers to say it, but there are various kinds of shelter. The question is what should one think of in choosing that shelter? There is the single house, the double house and the apartment, which varies from the so-called "two-decker" to that hive of families, the apartment hotel on the one hand for those with greater economic freedom, or the large tenement house of our city slums for those who have little to spend on shelter. It is no longer so easy for apartment owners to say, "Families with dogs or children not allowed," although it is

still too frequently said. Apartment houses are too numerous today to rule out children, and the problem now is to try to meet the needs of children in apartment houses, a subject which deserves serious consideration on the part of families as well as real estate owners.

Let us keep in mind what children need—sunshine, fresh air, relaxation, rest, sleep, exercise, etc. For exercise we must have space, outdoors certainly, indoors to some extent at least. The single house, set in its own yard seems obviously to offer space. It would seem, too, to offer more opportunities for sunshine. But neither the double house, nor the apartment, nor even the tenement house need necessarily prohibit these things. Small playgrounds within easy distance of tenement houses, roofs made safe for children, balconies, a small back yard, a window into which the sun streams part of each day, at least, may be means by which the requisites of space or sunshine are provided. Apartment houses without elevators make it very difficult for a mother on an upper floor to take her baby in the street in a baby carriage, but a balcony or even a room where the window may be kept open and through which the sun streams may provide the essentials for the infant whose need for space is not so great as the child who has begun to explore the world on his own two feet. For him there must be space for real exercise, if his need and desire for activity is not to get on the family's nerves and thereby create a behavior problem. The important thing is to keep the essentials in mind and use one's ingenuity in providing them in one way or another.

Space has another value besides providing the child with exercise. People do not find it easy to live successfully together if they are in continuous and close proximity. "The world is too much with us" is often true, and that individuals, especially certain types of individuals, need a certain amount of solitariness and quiet is generally conceded. This brings up the question of the number of rooms in the house, a matter which also depends largely on finances, although perhaps not as much as one might think. The small apartment with many modern conveniences, with an impressive entrance hall, and located in a certain desirable street may look more inviting

than the larger apartment on a side street and without all the extra conveniences; but the extra room or two are assets which must not be lightly discarded if they promise to fill some of the essential needs of the family rather than what is in reality a nonessential desire. Additional rooms give more air space, more chance for quiet, more chance for the children to have space which is their own where they may keep their own things and play their own games without running the risk of hearing frequent complaints because they are underfoot.

The family is made up of adults and children and the needs of the two are in many respects different. They are, nevertheless, needs, and the problem often becomes one of adjusting to meet the needs of one without sacrificing the needs of the other. The house is built for adults, the furniture and equipment are for adults, but children live in that house and their needs must be considered. A respect for furniture and walls is not inherent in children and although it should be developed, a child misses something very important out of life if there are no chairs which he is allowed to tip over to make a train or to set up a house or tent by covering with an old blanket. Imaginative play is too important in a child's life to deprive him of it in his home. Yet the adults' needs must not be ignored. The mother who is in need of rest because of an unusually heavy burden that has been placed on her must be relieved from too close proximity to the play of eager little boys who become for the time being various kinds of air planes traveling from city to city over land and sea. Space is indeed an asset to family life that must not be overlooked.

Space for the Child's Things.—The home should also provide space for the child's things. Whether it be but a corner of a room or a lower drawer or shelf, there should be somewhere in the house a space within reach of the child's arms which is the child's own for his own things. Not only must the place be provided, but it must also be respected as free from intrusion. His things, no matter how absurd they may seem in the eyes of the unimaginative adult, should not be ruthlessly cleared out, although it sometimes is necessary to teach the child that he cannot keep in his bureau drawer the "dear little dead mouse" he had found. Individual possessions and

provision in the house for keeping these possessions in order make not only for a clear-cut sense of property, but also for habits of neatness. If, for example, there has never been a hook within the child's reach, it is hardly to be expected that he will acquire the habit of hanging up his coat. No things of his own, no space for his own things make for difficulties in learning important lessons in life, viz., neatness, respect for property, and respect for the rights of others.

The Factor of Noise.—The matter of undue noise is another thing for consideration in choosing a home. Whether or not it has a permanently deleterious effect on the nervous system, the constant bombardment of certain types of noise seems to increase a tension which may end in an emotional outburst that brings stress and strain into the family situation. It may seem wiser on that account to take a house a block away from the noisy car line even though it seems less convenient. The chance for the children themselves to make a noise is another factor that must be considered. That "children should be seen and not heard" is no longer accepted as a maxim which should guide us in our training of children. Children are bound to be heard; it is right that they should make a noise, and children's noise, though it cannot be allowed to run riot, must be provided for in some way at some time in each day without becoming a source of irritation to the individual family or the nearby neighbors in the apartment. Fear of annoying the neighbors or of what they will say too often affects a mother's attitude toward her child. It is important to remember that a child must not be allowed to learn that he can get what he wants by crying because the thin walls in the apartment house make his mother fearful of annoying her adjoining neighbors. Better move out of the apartment if that is what is going to happen.

The Equipment of the Home as an Aid in Forming Desirable Habits.—As has been said, houses are built for adults and to a great extent are equipped and furnished for adults. But children are born into those houses and are to live in them. The home should provide for the child's physical needs but it should do more than that. It should be a help rather than a hindrance in forming desirable habits. A child, for

example, can hardly be expected to form the habit of clean hands before meals and of using his own towel if washing before dinner is either a matter of a hurried wash at the high kitchen sink at the hands of some grown-up when he comes in from play, or if the washing entails a long trip upstairs to a bathroom where nothing fits his size. Small toilets and bowls are expensive and though enticing are not essential. The thing which is essential if one would have children acquire the habit of cleanliness is to provide some way so that children may easily learn to wash themselves, reach their own towels, face cloths, and tooth brushes. It can be done if there are low hooks or racks, a chair or box to reach the high bowl, or a separate basin which can be set on a low stool. If the home is a house rather than an apartment, some arrangement for a downstairs toilet, for washing, and for hanging the outdoor things will help the child in forming desirable habits of cleanliness, elimination and neatness, for the child busy at play out of doors puts off going to the toilet until too late if that toilet is away upstairs and muddy feet must not be tracked though the hall.

The Economic Factor in Family Life.—The economic factor in family life is an extremely important factor to be considered. Although family life may be successful in its main elements, it cannot be denied that poverty and wealth inject certain difficulties into the family situation that sometimes are a predisposing factor to the family breakdown.

An income so small that it has no amount to allot to that essential, recreation (which is in truth re-creation) or which allows no margin for meeting the emergency of sickness or for saving, puts upon those responsible for the care of the children, especially if they are carrying that responsibility conscientiously, a burden which is difficult to bear without worry. Worry means a stress or strain which makes for tension and thereby destroys a certain serenity important to family life. A sense of insecurity is difficult for adults as well as children and a sense of insecurity about the money which is to provide some of the children's needs is indeed difficult for parents. One must not forget, however, that wise planning and an ability to differentiate between the essentials and the

nonessentials of life can do much to alleviate some of the difficulties of maintaining a satisfactory family life on a limited income. There are indeed certain values to be gained from life in a family where there must be careful counting of the pennies. A spirit of cooperation, of helpfulness, a self-reliance, a willingness to do without, a willingness to give up in order that some one else may have, are more easily fostered in the home where the income seems to need stretching, than in the home where the economic situation is such that these traits are not naturally required. The difficulties of having too little are obvious, and are often very great when the discrepancy between income and standards of taste and living is wide, but the dangers of having too much are, though less obvious, nevertheless important. The home in which there is plenty of service, in which it is economically easy to provide the child with everything that he needs must watch out lest the child has no chance to learn to wait on himself and lest he become selfish because not only is his every need supplied but his every desire is gratified. It becomes difficult to learn to differentiate between the essentials and the nonessentials of life when one is not called upon to decide upon what one must do without.

It is not possible to translate the term "sufficient income" into dollars and cents, for many factors enter into the decision. Time and place, the cost of living, and standards of living (a product itself of many different conditions) make "sufficient income" almost an individual matter. The children must be sheltered, clothed, fed, protected against disease, cared for if sickness occurs, and educated to meet life as successfully (not used in the material sense) as possible; but so varied are the individual interpretations as to how this should be done that it makes a definite statement impossible. There is a goal of physical and social well-being which we desire that children may reach, but the ways by which it may be reached are varied. The human body has a tremendous power of compensation in the physical realm. It learns to adjust itself sometimes to almost unbelievably difficult handicaps, and it would seem as if this principle were true in the intellectual and social life of the individual as well. One would not deliberately set up economic, physical, or social handicaps for any child, but if

they do occur one must not consider them necessarily overwhelming, dooming the child to what the condition seems to indicate. There may be inherent in the very challenge of difficult situations compensations worthy of consideration.

Social Aspects.—Family life in its social aspects as well as its physical and economic aspects presents wide variations, and in one case there must be compensation for one thing and in another case compensation for another. Each family has certain assets and certain liabilities. Some of the liabilities are not inevitable but may be done away with, perhaps by a change in attitude on the part of the parents, but some of them must undoubtedly be met and compensated for in one way or another. For example, the chronic illness, possibly of an elderly relative in the family, seems in many ways a distinct liability in family life, making a certain amount of play and noise impossible, tending perhaps to inject an element of repression into the situation. Yet that very situation has in it the possibility of giving children invaluable opportunities to learn the lessons of thoughtfulness and consideration for others, as well as a self-reliance which comes from learning that even though little, one can share in the care of one who is old.

There are many types of relationships that exist in family life. In the intimate life of those who are sharing life under one roof one may learn to live with those of all ages, of the same sex and of the opposite sex, of a sympathetic point of view and of an unsympathetic point of view. Within the family one may run the gamut of almost every experience which life offers. Constant association necessarily brings its irritations as well as its satisfactions and the lesson of meeting irritations with success is a lesson that is an important one to learn. Constant association also gives one an opportunity to get another's point of view, to learn to read between the lines of action and to know that what seems like unaccountable behavior may be but the cloak to hide an emotion which others do not suspect. The intimate experiences of family life, especially if one has the rich experience of living with many personalities, are experiences which reveal much as to the causes of human behavior if one's eyes are open. Brothers and sisters, parents and children, guests of the family, pos-

sibly grandparents and children, boarders and children, servants and children, each situation offers opportunities for children to learn how to live with people in such a way as to benefit themselves and their people. We live in a world of people like and unlike and until we learn how to do this successfully, beginning these lessons in the family, there can be no peace.

SUGGESTED QUESTIONS

1. What are some of the reasons why the family seems important as a social institution?
2. In what way has the patriarchal type of family been modified and what factors have entered into the modification?
3. Discuss some of the reasons why women work.
4. In what ways has woman an economic value in the home?
5. Discuss some of the factors making for instability in family life today.
6. What is the great value in the family of today?
7. Discuss some of the requisites for satisfactory family life.

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CHAPTER X

FAMILY RELATIONSHIPS

Family Conditions and Attitudes Influence Children's Behavior.—Children respond more or less immediately and more or less completely to a rise or fall in family fortunes, presence or absence of illness in the family, to an increase or decrease in family happiness, to excitement, anxiety, tension or strain of any kind. They also reflect family attitudes toward work, play, religion, sex, and other important things in life. Likes and dislikes, loves and hates, are often only the reflection of likes and dislikes, of the loves and hates of those who surround us in early childhood.⁵⁴

There is evidence, however, that a given condition will not produce the same kind of behavior in all children, but that individuals differ in their reactions and behave in a manner which depends somewhat upon the general type of personality to which they belong. Before we undertake further discussion of the important family conditions and attitudes which influence the behavior of the child, then, we must understand something of the three or four general types of personality usually agreed upon as determining the child's reaction to specific situations.

TYPES OF PERSONALITY WHICH DETERMINE THE REACTION OF THE CHILD TO FAMILY ATTITUDE

Stable or Unstable.—Cameron,²² an English writer, says that there are at least two major types of physique and personality to which people belong. He says that people are born with a tendency to be either stable or unstable. Watson¹⁶⁹ and certain other writers dispute this, saying that although the individual shows tendencies toward stability or toward instability at a very early age, he is not born so, but acquires the tendency as a result of his experiences during the first few days or weeks of life. We have not yet enough evidence to

settle this argument. For practical purposes we need only to recognize that, whether the traits are inborn or are acquired shortly after birth, children do seem to lean toward stability or instability very early in life.

The child who is dominantly stable is the so-called "good baby." He does not cry easily, he takes the breast easily, has slight trouble learning to drink from a bottle or a spoon, is not easily upset by changes in food, or changes in light or temperature. He sleeps soundly through ordinary noises or distractions, is not particularly upset by physical pain, and is not especially liable to disturbances of digestion. As he grows older he is steady-going, adaptable, and usually happy.

The child who is dominantly unstable is a picture of the reverse qualities. He is likely to have trouble in learning to take the breast, is inclined to be easily upset by change of any kind, cries easily, fatigues easily, runs a temperature with slight cause, and is susceptible to digestive disturbances. As he grows older he gives evidence of overexcitability and hyperactivity which often lead to excessive fatigue. This fatigue is of the type that deceives parents, since an overexcitable child when tired does not as a rule become sleepy, but is likely to run faster, shout more loudly, and appear unusually alert. When finally put to bed he will, if overtired, take a long time to go to sleep and will, after the first exhaustion is slept away, spring into action again, driven by an overexcited nervous system to demand entertainment or attention at four or five o'clock in the morning. It is usually hard to convince parents that these symptoms point to the need of more rather than less rest. The unstable child is likely to be changeable in mood, and is particularly likely to over-react to any nervous strain or emotional tension in the family atmosphere.

Both Types Are Desirable in the World.—The above description does not necessarily mean that the stable child has a more desirable personality than the unstable child. Stability may sometimes amount to flaccid indifference, and to stolid lack of imagination. Whereas the child who reacts keenly to sensory stimuli, seeing and hearing things that others fail to, and who has an alert and fertile imagination may be classed as unstable but may be far more interesting as a personality

and may make a far greater contribution to the art and thinking of the world than the so-called stable child. An unfortunate aspect of the unstable child's history is that he is usually born of unstable parents; not only must he bear his heredity, he must, if he lives with his parents, live during his most impressionable years in the unstable environment which unstable parents inevitably produce. Thus he has no ally in his environment to help him overcome the handicap of his heredity. We can indeed feel the tragedy of the child who, needing more than most children a quiet stability of environment, must be surrounded by the persons whose heredity forced the need upon him, but whose very nature makes them least fitted to fulfil that need. Tragic as it may seem, it is the unstable parent who is most likely to burden a household with the bugaboo of the word "nervous," who himself flies to pieces in the very crises with his child that demand quiet self-control. He, the parent of an overexcitable child, is most likely to produce an atmosphere of overexcitement. The unstable child, most in need of regularity in routine, most easily disturbed by irregularity of feeding, of sleep hours, of elimination, is usually the child whose parents are most likely to offend by interruptions in routine. The stable child, who could best survive extra movies, delayed meals, haphazard hours for toilet attention, is seldom the one who has to adjust to such difficulties. His parents do not crave the stimulation of constant parties and extra guests in the home; nor do they worry too much, nor keep themselves in an overfatigued state of hypochondria.

Charles and Sally illustrate this point. Charles, a tense, high-strung boy of three, is constantly on the move. He runs about, seldom slowing his movements down to a walk, is likely to shriek with excitement every few moments in his play, cries easily when hurt, and finds it almost impossible to relax at nap time. He is never ready to go to bed at night, often lying awake until ten or eleven o'clock even though put to bed early. In spite of this he is usually to be found jumping about in his bed or running about his room ready for action at five o'clock in the morning. His family seem unable to help him achieve rest. Both his father and mother are quick-moving, high-

strung people whose voices are inclined to shrillness and whose presence adds tension and excitement rather than relaxation and quietness to the family atmosphere. The mother has tried rubbing Charles' back at night in order to help him to relax, but her own tenseness serves only to key him to a still higher pitch. The remedy for Charles' excitability is not to be found in rigorous insistence that he sit quietly for certain periods of the day or that he spend more hours in bed, much as these would help. The real solution lies in a change of family atmosphere—a reorganization of family routine to minimize hurry and to build up more of a feeling of leisure, a definite rest period for the mother in order to decrease her fatigue and feeling of tension, and fewer family excursions of an exciting nature.

Sally, on the other hand, is a child who plays hard but who stops to sit quietly when she becomes tired. She alternates quiet periods of handiwork or of looking at books with periods of vigorous play. Her voice has the quiet pitch of a rested child, and is seldom shrill or whiney as is the voice of an over-excited or overfatigued child. She is hungry at meal time, eating her meal with dispatch, and trots off quietly to nap or to bed where she drops to sleep within five or ten minutes. She awakens refreshed and smiling. Sally's parents are quiet-voiced, well-poised people who have a great deal of pleasure but who seldom allow themselves to become overfatigued to the point of irritability and tension. They go out frequently and have guests in their home, but always manage so well that Sally has a fairly quiet supper and gets to bed before guests arrive. The mother plans the day's routine so that breakfast can be an unhurried meal, that dressing, toilet, and other essentials are allowed for in time, thus minimizing the feeling of tension and hurry which plays so large a part in Charles' life.

Routine Can, However, be Overdone.—The unstable child needs special regularity; yet even he can suffer by being "over-routinized,"* and overprotected. A fairly safe rule for any child, stable or unstable, is to see that he leads a fairly regular life, yet one which is not monotonous or devoid of interest, and to see that, while leading as normal and satisfying a life as

* See case study Anna at the end of the chapter.

possible, he is protected from exposure to nervous strain, emotional tension, or overstimulation of any kind.

Introvert or Extrovert Another Way of Viewing Personality.—Another classification into which people may be divided is that of introverts and extroverts. Some children have a tendency to be *introverted*, others to be *extroverted*. These words mean to *turn in* or to *turn out*, and when applied to people mean that some people have a tendency to turn their attention and interests toward a center inside themselves, and some toward a center outside themselves. The one type, called introverts, are more interested in ideas than in people or things, and are more inclined to “sit and think” than to “go and do.” They are likely to be the students and philosophers of the world. The other type, called extroverts, are more interested in people and things than in ideas. One usually finds them among the business people, the mechanics, the political, social and business leaders. Most people belong neither to one marked type nor to the other, but have some traits of both types as we shall see later. In so far as the child leans toward one type or the other, however, he is likely to react to specific situations in one way rather than in another. To seize upon the following discussion as a basis for diagnosing personality types would be to presume too greatly upon the scientific knowledge now available about personality. The only aim of such a discussion is to correct the false idea that specific situations in family life will inevitably give rise to specific and predictable behavior reactions in all children. Not all children react to given situations in the same way, but will differ at least somewhat in accordance with the tendency toward one personality type or the other.

The Child Who Tends Toward Introversion Reacts Differently from the Child Who Tends Toward Extroversion.—When an introvert has met with unhappiness he is likely to retreat into thoughts and day dreams; the extrovert is likely to try to “work it off” in action, or to seek solace from people. If a child has, for lack of normal companionship, developed imaginary companions, the introvert child will find such companions very real and so satisfying that he is inclined to cling to them even when flesh and blood children are provided for

him to play with. The extrovert child, however, finds imaginary companions a pale substitute for live children, and when exposed to children abandons his shadows promptly in favor of real substance.

If a parent nags his child too much, the introvert child is likely to give submission in action but to withdraw to his world of dreams for his interest and satisfaction in life; whereas the extrovert child is likely to fight his parents, to become "negative" and resistant, because he can find interest and satisfaction only in the real world, a world in which he finds himself so constantly intruded upon that he must resist. One should not punish an introvert child by making him "sit and think"; he has too much tendency to do this already and may get from his punishment only a habit of magnifying grievances and "building mountains out of molehills." On the other hand, a short period of "sitting and thinking" may be just what the extrovert child needs to make him take time from his numerous active interests for a quiet analysis of his own motives.

. The introvert child, being quiet and withdrawn, usually slips past his parents and teachers without attracting much attention or causing much anxiety. He is not troublesome, and hence is seldom reported to clinics for help unless it appears to the adults in charge that he is uncooperative. He usually meets his problems alone and unaided, burying his difficulties within himself or retreating from them to his day dreams. The extrovert child, on the other hand, meets his troubles in the open. Symptoms of conflict or of unsolved problems are immediately evident. If he finds life unchallenging or unsuccessful he promptly feeds his natural curiosity by probing and investigating—often in forbidden places—or seeks success in mischief. He throws pin darts in school or incites rebellion against the teacher to keep from being bored. He may steal or lie to create excitement. In any case, he finds something to do which, though often producing trouble, at least provides a growing mind with something substantial to feed upon, or permits a real outlet for emotion. The introvert child, unchallenged or unsuccessful, retreats quietly. He is no trouble, so we miss the fact that he may be feeding his

mind on shadows, or collecting steam from unsatisfied longings which occasionally bursts forth in explosions or resentments. The psychologist is likely to worry about the future of the child who is docile and withdrawn—the child about whom parents and teachers often congratulate themselves most, and is likely to feel comfortable about the future of the child who “is the despair” of his parents and teachers.

Types Are Not Clearly Defined in Most Children.—We must bear in mind that there is no clear-cut demarcation be-

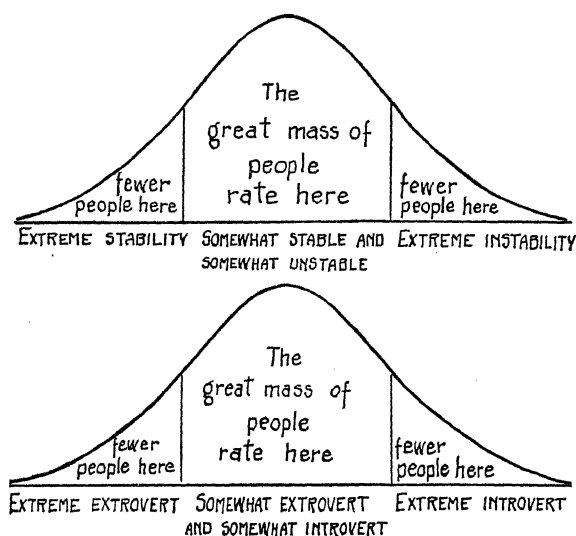


Fig. 57.

tween stable and unstable, or between introvert and extrovert. The great mass of people are somewhat stable and somewhat unstable, somewhat introvert and somewhat extrovert. The familiar bell-shaped curve illustrates the probable distribution.

Neither extreme of stability or of instability, of introversion or of extroversion is to be cultivated as an ideal, but each should be achieved to the extent that stability is seasoned with adaptability, instability with a basis of sound habits; intro-

version and extroversion should temper each other. Wickes¹⁷⁸ states the case for these. "Introversion must be guided so that it may not become morbid introspection, which shuts the person away from the world of human activity and human relationships, but rather a process making for the understanding of these and leading at last to a realization of the good within. Extroversion must be controlled so that men may not become lost in the multiplicity of things, but may be able to meet squarely the responsibilities of adaptation to the world. Neither of these two forms of psychic activity may be emphasized at the expense of the other if man is to develop as a whole. Any attempt to stimulate the growth of one side while suppressing the other must result in frustration."

We should remember when dealing with children to watch for tendencies toward one extreme or another of type, and should accept such tendencies as important in producing behavior and determining reaction to guidance. We should take them into consideration when we make demands upon children and when we evaluate and treat their behavior, molding our program to produce best results not only for immediate solution of problems, but also for the future personality growth of the child.

OTHER FACTORS IMPORTANT IN DETERMINING THE BEHAVIOR OF CHILDREN

Constitution of the Family.—The effect of the constitution of the family is important as an influence upon children's growth and behavior. Not only is the size of the family important, but the child's place in the family is of consequence, for even though several children may be brought up in the same family they do not have the same environment. Goode-nough and Leahy⁴⁹ of the Minnesota Child Guidance Clinic made a study of 293 children whom they had rated in a number of traits by their teachers, and whose place in their families was investigated. It was found that the oldest children showed tendencies toward lack of aggressiveness and self-confidence, lack of qualities of leadership, much suggestibility, some seclusiveness and introversion. The middle children showed these traits in a lesser degree. The youngest children showed

no outstanding characteristics excepting an unusual individual variation in traits. The only children showed high ratings for aggressiveness, self-confidence, for gregarious interests, and for instability of mood, and flightiness of attention. Other studies have been made, the results of which we do not entirely agree with; but all of them indicate our need of understanding something of the possible influence upon a child of the place chance has given him in his family.

The Oldest Child.—The oldest child has had at least a year or so in the family as the only child, after which he is forced to yield part of the attention and affection of his parents to a younger child. If he has been prepared to share his place willingly with the new baby and if he finds himself shifted to a position of older brother and in this rôle is given a new type of attention and affection, he will probably take the change in his fortunes gladly. But if he finds only that the arrival of a new baby means complete displacement for him the change will cost him much in emotional strain.

The oldest child suffers another handicap. Having been the first child he has had to serve as practice material for his parents, and has had to suffer from whatever mistakes they made through ignorance. There is hope that oldest children can be spared this handicap as the movement for preparental education grows, since through preparental education there can be provided a knowledge of the principles of parenthood before the arrival of the emotional strains and responsibilities of children. In some families the oldest child remains the favorite and is spoiled accordingly. In other families he becomes a substitute parent for younger children and has too soon too great a burden of responsibility. He may, for example, be the one who cannot have advantages of higher education, yet is sacrificed to produce that advantage for younger brothers and sisters.

The Youngest Child.—The youngest child in the family, on the other hand, is likely to suffer because he has no occasion for giving place to a successor and thus remains the baby of the family too long. He may be deprived of the privilege of carrying a normal burden of responsibility, and may grow up a spoiled, dependent type of personality because he had no prac-

tice in sacrificing himself for the welfare of the family group. Occasionally the youngest child suffers for another reason. With all the older members of the family not only to wait on him but to "boss" him, he may become irritable and defiant, or quiet and sullen because he is subject to too constant and too inconsistent commands. It is particularly important that the youngest child be given the same opportunity for growth toward independence and self-responsibility that other members of the family have.

The Middle Child.—The middle child or children may suffer because, being neither first nor youngest, they are allowed to slip into the background of parental attention and affection. They are likely to inherit the clothes of the oldest, and to spend their lives trying to imitate the behavior or win the approval of the older brothers and sisters, thus failing to live their own lives or to develop their own personalities sufficiently.

The Only Child.—There is a traditional belief that the only child will inevitably turn out badly. This, of course, need not be true. Only children often turn out extremely well. There is, however, some danger when two parents have only one child upon whom to lavish all of their attention and affection. They are likely to find it too difficult to deny any of his whims or to discipline him for undesirable behavior. There is double danger for the only child, since if parents fail in discipline in large families the brothers and sisters are fairly sure to see that selfishness and other bad behavior are curbed. If, however, the parents of an only child fail him in this respect he has no brothers or sisters to help him. Parents of only children should be especially careful to see that these children receive adequate discipline, and that they have adequate opportunity to learn the natural lessons of independence, of unselfishness, and of the give and take of life. These lessons can best be learned in free contact with other children; so for this reason, as well as to insure normal social development, only children should from an early age be encouraged to make contacts outside the immediate family and to select their own companions with some degree of freedom.

The Only Boy or Girl.—The only boy in a family of girls and the only girl in a family of boys are usually in some de-

gree selected for special treatment by the other members of their families. The danger here is not only that such a child may receive an undue share of attention and affection, but that he, or she, may get the idea that there is something particularly sacred about the sex to which he, or she, belongs. Any situation in a family which permits undue privileges to one sex, either to boys or to girls, at the expense of the other sex is harmful to the growth of the children of both sexes. Each sex should be taught a fundamental consideration for the viewpoint and the happiness of the other. Whether a boy or a girl, each child should learn that there are far greater differences of personality within either sex than between the sexes; that kindness, generosity, sweetness, courage, strength on the one hand, or brutality, selfishness, ugliness, cowardice, weakness on the other are traits to be found within both sexes, and that none of them are to be assigned sweepingly to either sex as a sex characteristic. One owes loyalty or dislike, not to one's own sex or to the opposite sex, but to certain persons who display given characteristics regardless of sex.*

Families made up of boys only or of girls only should see that cousins or neighboring children of the opposite sex are introduced often enough and for long enough periods that close acquaintance follows. Acquaintance with members of the opposite sex in the routine of school and of daily living is advisable not only to give acquaintance with personality traits of the opposite sex during school years, but also to develop a natural social ease between the sexes. Familiarity with younger brothers or sisters or with younger children of the opposite sex may serve also to give in early childhood the knowledge of differences in anatomy of the sexes which child training specialists feel should be achieved before children are of school age. Acquaintance with the anatomy of the opposite sex comes naturally and easily if boys and girls share the daily routine of living in infancy and up to four or five years of age. Practically all authorities in sex education agree that natural and early acquaintance with the essential differences in sex anatomy is desirable because it satisfies a very natural curiosity

* See case of The Smith Family at the end of the chapter.

at an age when emotional factors have not risen to attach undue significance to the information.

Differences in Ability and Appearance.—We should recognize, too, that differences in ability and differences in appearance may, and usually do, conspire to produce differences in the amount of attention and affection given to children. A single normal child in a family of superior children, a single dull child in a family of normal children, or a single unattractive child in an attractive family is almost sure to suffer because of the constant unfavorable contrast. If such contrast becomes obvious to the child, the resulting sense of inferiority may prove disastrous to his personality growth, and may keep him from developing to the maximum whatever ability or appearance he may have. Attempts to avoid inferiority feelings should not, however, be allowed to develop into situations in which weaknesses of body or mind are allowed to serve as excuses for wholesome effort toward achievement on the part of each child in the family. Even though a child may be handicapped by a crippled body we should insist that he make a real effort to carry his share of family responsibility. Otherwise he may learn to cherish his weakness as a means of attracting attention or as a ready excuse for laziness, and may thus grow up not only with a crippled body but with the handicap of an undesirable personality as well.

On the other hand, a single superior child in a family of normal children, a single normal child in a family of dull children, or a single attractive child in an unattractive family may receive altogether too much attention, and may develop an unwarranted sense of superiority, thus growing into conceit, intolerance, and laziness.

How to Meet These Differences.—The best way to meet these differences is to see that each child in the family is awarded praise or blame according to his effort as well as according to his product. Each child should come to recognize his capacities as well as his shortcomings, and should develop a sense of responsibility for contributing, first to the family, and later to society, the best that he has to give. Each should learn the value of humility for his faults and shortcomings and should grow up with a determination to overcome his failings

if reasonably possible. No child should take upon himself the credit for inheritance of a superior brain, or an attractive body; yet, he should appreciate his gifts and should feel responsible for their proper care and development. Attractive or unattractive, brilliant or dull, every child should learn the value of good work habits, of unselfish consideration for others, and of tolerance.

Regardless of sex, age, ability, or appearance there should be no obvious favorites in any family. This does not mean, of course, that all members of a family can or do love all other members with equal intensity or with equal understanding or rapport. It does mean, however, that each member of the family should at all times and under all circumstances show reasonable respect and consideration for all the other members of that family. Only in so far as we achieve this can we hope to achieve eventual harmony and progress in society at large, since social habits learned within the family largely determine general social viewpoints.

AMOUNT AND KIND OF AFFECTION TO GIVE CHILDREN

Parent-Child Relationships of Extreme Importance in the Development of Children.—In family life one of the most important factors which influences the growth and development of the child, especially his emotional development, is the relationship existing between parents and child. Fundamental to this relationship are such considerations as the amount and kind of affection existing between parents and child, the amount and kind of discipline given by parents to the child, the ambition parents hold for the child, and other similar considerations.

Perhaps the first thing parents think of in connection with their relationship to their child is how much they love him, or as sometimes happens, how much bother it is to have him about. It seems impossible to most of us that parents could fail to love their children; yet some parents do fail in this respect. The effect is inevitably disastrous to the child, for all children crave the security of knowing that they are loved.

Children Need to be Loved.—Dr. Josephine Baker⁹ in speaking of the mortality rate among infants in foundling

hospitals says: "High mortality rates are common to institutions of this type. They are in no sense an indictment of the way in which the institutions are managed. There are few foundling hospitals at the present time that are not conducted as well as any modern baby hospital. Practically all of these institutions have competent medical boards, use the most improved and modern methods of hygiene, and give the children under their care the best possible health supervision that can be afforded by any institution. The difficulty seems to be not in neglect, but in the mere fact of 'institutionalism.' There can be no question whatever that babies cannot be raised wholesale. The most important factor in the welfare of a baby is his mother. Moreover, babies cannot be kept alive by routine care, no matter how efficient or systematic it may be. Babies who are merely nursed, bathed, and turned at regular intervals are quick to lose their vitality. Every baby needs mothering." It is a fact well known to nurses in children's hospitals that after the critical stage of an illness has been passed, if the convalescence is long children and infants gain strength faster at home where they can feel the love of their parents than they do in hospital wards where they are deprived of that love.

Some parents, as has been said, do not love their children enough. The general type to which the child belongs determines in some measure what his reaction to insufficient love will be. If he is of one type and receives too little love he may brood quietly, withdraw into himself, and will perhaps develop an abnormal appetite for affection, though giving the appearance of hard indifference to affection. If the child is of another type he may throw himself into busy activity in an attempt to forget the slights of his parents. Depending upon his type he may grieve himself into illness; or he may become delinquent and destructive, taking his resentment out on the world about him, or making a desperate attempt to command the attention of his parents.

Too Much Love of the Wrong Kind is Bad for Children.—On the other hand, parents sometimes love their children too much in the wrong way, showering gifts upon them, protecting them too much from the ordinary hardships of life, kissing

and caressing them excessively.* Children react variously to this, too. One child may yield himself utterly to the warm, protective atmosphere; may fail to achieve a desire to stand on his own feet, may learn to shrink from facing a world in which he is not pampered and protected. Miss Van Waters¹⁶² refers to such a child as "... the child that emerges from the warm bath of possessive affection weakened for anything but the evasive, indirect and passive rôle." Even worse than this, such a child usually develops an excessive appetite for physical caresses, and becomes so dependent upon them that he can understand or tolerate no other expressions of love, but goes about through life seeking constant gratification of his appetite. We need no amplification of this point to see how seriously handicapped in life such a child is. Another child may grow to regard the hothouse atmosphere of too much love as stifling to his urges toward independence. If he does, he will probably generalize from his childhood experience and develop a harsh intolerance toward all manifestations of love, feeling that any evidence of love is dangerous to individual freedom. Still another type of child may come to assume blandly that the world owes him constant evidences of love and appreciation for which he need make no effort or return. It seems fairly evident that none of these reactions to excessive appreciation, protection, or fondling are conducive to successful or desirable personalities. Least of all do they prepare an individual for the understanding and skill in love which are essential to happiness in marriage.

Another common practice with children, doubtless often motivated by a desire to insure the development of social technics which will make them socially attractive, is to encourage them to "play up to" and caress people in general, in some cases even to strangers. We may well pause thoughtfully when we see in a nursery school center a three-year-old child who approaches every newcomer with her arms held up and the demand, "Love me." A moment's thought will serve to make us see that it is unwise to teach children to kiss people indiscriminately—the habit is too likely to fix itself.

Psychologists Differ About Physical Caressing of Children.
—In discussing the physical caressing of children Watson¹⁷⁰

* Caruthers.²⁶

states an extreme view which several psychologists have reached after dealing with the many cases of childhood tragedy and adult neuroticism traceable to excessive demonstration of affection by parents and other adults. He says: "There is a sensible way of treating children. Treat them as though they were young adults. Dress them, bathe them with care and circumspection. Let your behavior always be objective and kindly firm. Never hug and kiss them, never let them sit on your lap. If you must, kiss them once on the forehead when they say good night. Shake hands with them in the morning. Give them a pat on the head if they have made an extraordinarily good job of a difficult task." It must be remembered, however, that this is a statement of the extreme view, and that many authorities differ from it rigorously. Many psychologists find that insufficient evidence of love leaves children starved, craving affection and resorting to undesirable habits in an attempt to find satisfactions (see p. 109, discussion of thumbsucking).

Symptoms of Wrong Kind or Amount of Affection.—We may turn for guidance in the matter of desirable amount and kind of parental affection to a brief survey of symptoms which are pretty sure to appear in the child's behavior if all is not well. Any deviation from the average in a child's emotional expression should suggest to the parent, teacher, or clinical examiner at least the possibility that the environment of affection needs investigation. Emotional apathy, emotional instability, excessive shyness, excessive boldness, negativism, feelings of inferiority, excessive demands for attention, jealousy, too great or too little dependence on adults may any of them indicate difficulty in this field. This is, of course, a negative approach. A positive approach is obviously better, for if we wait for symptoms of wrong relations to appear we will probably find it exceedingly difficult to bring about changes in these relations. Then, too, prevention is vastly more efficient since it avoids useless waste of time, energy, and what is more important, of human happiness. Moderation is a safe rule. "A nice balance must be kept so that physical expression shall neither be rebuffed nor allowed to exist in and for itself."*

* Watson.¹⁷⁰

Love Should Not be Used as an Instrument for Discipline.

—Another abuse of the love relationship between parents and children is the use of love as a discipline measure. "Mother loves you when you're good," "Daddy can't love you if you are bad," are commonly used as lashes to whip children into shape. Oftentimes if the verbal appeal is not sufficiently powerful with a young child he is rewarded for good behavior with ardent caresses, or the parent conveys the idea of hurt feelings with pretended sobs. Such methods are usually extremely effective in producing immediate results, since children are notoriously tender-hearted. There are several reasons, however, why we should not govern children by this drama of affection. One reason is that it is so effective—it tempts us to excess, with the attendant evils of excess which have been discussed above. More than this, we must recognize in this connection a fundamental principle in child care: Excessive stimulation of any emotion in childhood should be avoided whether the emotion be one of fear, anger, grief, exhilaration, or of love. Another reason why we should avoid the use of love as a disciplinary measure is that if we love a child at all we must of necessity lie to him when we say that a single bit of behavior can win or destroy that love. He can gain from such statements only an example of lying, or, if not that, a false notion that love is something to be lightly given or withdrawn as a reward or punishment for trivial bits of behavior.

To summarize the discussion of affection let it be said that children should receive enough affection to make them feel secure in love, but not so much of the overprotective, over-demonstrative kind that they are cut off from independence or are given an excessive appetite for appreciation and physical demonstration of affection.

AMOUNT AND KIND OF DISCIPLINE**How Much Obedience Should We Exact from Children.—**

The second question that arises in the minds of most parents when they think of their relationship to their children is the question of obedience. Unfortunately, many parents do not stop to think about the matter at all, but live with their chil-

dren from moment to moment exacting obedience or excusing disobedience by whim rather than by principle. If a discussion on the subject arises, however, we will find two extreme viewpoints and all grades of variation in between. On the one hand, some parents will say that they expect instant and unquestioning obedience from their children, and will give as their defense a statement that obedience is a difficult but necessary life lesson which must be learned early and thoroughly. On the other hand, some parents will say that the most important thing for children to learn is to make intelligent and independent decisions and to express their inner thoughts freely. Obedience as such, they say, has no place in child care and should never be exacted; all behavior should flow freely from within outward. "Self-expression," in other words, should be supreme.

As a general principle in child care, it can be said that *extreme views are seldom right*. So in this case, neither extreme of discipline is desirable. Parents represent all authority to the young child. The attitudes which he develops toward them are important to his attitude toward all authority in adulthood. Whether he obeys the laws of his state or church, whether he obeys the dictates of convention, of society at large or of his own immediate group, or whether he defies these laws and dictates will in large measure be determined by his habit of obedience to the authority represented by his parents, his home, and his school. Many writers believe that the child must respect his parents as worthy ideals and as worthy censors of his natural behavior if his growth is to be sound. Parents must serve, then, as worthy examples of behavior, and as worthy disciplinarians if the child is to develop an effective "super-ego" or "efficacious inner power"* with which to discipline and control his primitive instinctive impulses.

Instant and Unquestioning Obedience is Undesirable.—If as the result of a program of extreme rigidity in discipline an individual goes through childhood yielding instant and unquestioning obedience to authority, we can scarcely expect him to behave differently toward authority in adulthood. He will, if sufficiently trained in docility, do anything he is told.

* Seabury.¹²³

He will, if trained to depend on other judgments than his own, be unable to think for himself. The freshman who enters college unable to decide where to live, what courses to take, what clothes to buy, which friends to make is a familiar spectacle to every dean. Being unable to resist commands he does as nearly as he can whatever he is told to do by anyone no matter how unwise for his own welfare the commands may be. Such docility is the usual reaction of the introvert child brought up under a régime of instant, unquestioning obedience.

The introvert child may, however, react to rigidity in quite a different way. Instead of becoming docile he may develop the habit of sullen withdrawal, growing up to resent direction and to react to it by pouting or sulking; or he may give surface obedience but live in reality a life of stubborn resistance. In this case he usually becomes apt in the art of deceit, appearing to do what he is not really doing, appearing to think what he is not really thinking. Of such is the essence of hypocrisy.

On the other hand, an extrovert child is likely to react to repressive authority by open rebellion, and may grow to adulthood with a completely negative attitude toward authority. Such people are familiar to us as needing to be "handled with gloves." They are unable to hold positions because they "fly off the handle" when given orders; they "simply can't stand to be bossed." They are the anarchists of the world, the typical "aginners," being against anything which smacks of authority. Every college dean knows these people, too—the students who want to cast aside everything that is upheld by convention or tradition for the naïve reason that they "can't tolerate being dictated to."

Unlimited Freedom of Behavior is Also Undesirable.—Perhaps enough has been said to make it clear that the "instant and unquestioning obedience" program is not conducive to sound growth for any type of child. Let us analyze the program at the opposite extreme where unlimited "self-expression" is encouraged. The child who gets the idea that he need obey no dictates but those of his own impulses is indeed in a false position. He may soon discover (for his own welfare we would hope the lesson would come early) that even though his impulse may crave flying across the room as he has seen Peter

Pan do at the theater, he may not do so because the physical law of gravity is more powerful than his wish. More serious than this, he may wish to live his days without eating vegetables only to learn too late that impaired health results. He may try to express his impulses of snatching toys or of striking other children, only to learn that he is soon ostracized and left to play alone. Breaking the neighbor's window, or pulling up his father's garden is hardly to be condoned simply because he happens to feel that he is expressing something inside himself. Yet, hard as it is to believe, there are parents who actually fail to see that such extravagant "self-expression" does not free the child but only makes him the slave of his own whims. Impudence or lack of consideration for other people should never be confused with independence or creative expression. They are utterly different.

Both Freedom and Self-control Are Necessary.—Sometimes this attitude of reverence for the child's wish is only a compensation on the part of parents who, refusing to work on the old principle of despotism in child training, feel the necessity of working on some sort of a principle, and have found nothing less extreme than a complete "hands off" policy. Yet, as Seabury¹²⁸ points out, few parents have the courage to exercise this policy to its natural conclusion. They give the child extreme liberty until they find him about to learn a severe lesson as the result of some inexperienced choice of behavior; then they step in to protect him from the natural consequence of his action, and hence deprive him of the opportunity to learn *the need of natural restraint within liberty*. Parents who give verbal loyalty to the principle of "self-expression" but who lack the courage to let the child learn the discipline inherent in such a policy are doubtless the parents to whom Seabury refers when he says: "Thousands of American homes are without the ancient despotism in child training. There is only an empty void in its place. These parents cannot accept or successfully apply old ideas, and so they apply none. Son and daughter grow up in a protected, loose, undirected liberty, sure that they will be supported, taught not to exert themselves, made to be parasites, permitted to be self-indulgent, helped to be indolent. Tragedy results."

The Wisdom of Explaining Reasons Before Asking Obedience.—There are also parents who think that obedience should never be expected unless the child understands the full reasons for his action. On the whole this is an excellent principle, but most children soon learn that if parents are always ready to explain reasons they may be side-tracked from carrying out commands or persuaded to withdraw them altogether when bombarded with enough "whys." Children should never be allowed to use "why" as a means of postponing obedience once they really understand the nature of the command given. We must, of course, make sure that commands are really understood before we become arbitrary about seeing that they are executed. We must realize, too, that there are certain emergency occasions when commands must be obeyed instantly for the sake of safety and other occasions when the reasons behind commands would be incomprehensible to the child. Implied in both of these cases is a habit of obedience to an authority which the child has learned from experience is reasonable, consistent, and interested in his own ultimate welfare. To delay obedience under such circumstances because of insistent "whys" would be either dangerous or unreasonable.

Some General Rules for Obtaining Obedience.—A few rules may help in this respect:

1. Before giving a command take care to gain the child's attention.

2. Phrase the command in language that he can understand. A four-year-old, for example, does not understand "in the upper right-hand corner you'll find so-and-so."

3. Enunciate slowly enough and clearly enough to be sure he follows you. Children of less than five are still learning to distinguish the meanings of individual words.

4. Do not give too many commands at once. A child of five can execute three exceedingly simple commands at once, but only if they are repeated at least once under concentrated attention before he sets out to obey.

5. Be consistent in commands. Do not tell him to do one thing today and a contrary thing tomorrow.*

6. Ask him to do only the things you really intend to have

* See case Betty at the end of the chapter.

him do. Do not, because you have not stopped to think, or simply to show your authority, give needless commands which you do not carry to completion or which you lightly withdraw when you realize their uselessness.

7. Be sure that you are reasonable and right in your requirements; then see that commands are carried out.

8. Do not give commands or allot punishment in anger.

9. Do not use threats or bribes as a means of gaining obedience.

10. Do not make misbehavior interesting by making it exciting or profitable.

Developing Desirable Attitudes Toward Authority.—On the whole the child should have a gradually developing experience in independent judgment of authority, since adjustments to authority comprise one large class of adjustments necessary in adult life. Whether we wish to admit it or not, no individual can do as he pleases. He may fondly imagine that there is no authority outside the realm of his own individual autonomy, but in practical living he must constantly make adjustments to physical and to social law. He must recognize that, no matter how much he may wish to place his hand on a hot stove without burning it, he may not do so because physical law dictates that flesh becomes injured by burning when exposed to a given temperature. He must learn that society has organized itself according to a mutually agreed upon set of traffic rules, and that, even though he as an individual may wish to disregard a red traffic light, he may not do so without danger to his life because the rest of society regards the counter green light as a "go" signal. The same principle holds of the less well codified social laws: Individuals are not autonomous in themselves but must accept the inevitable consequences which follow, entirely regardless of individual wish, upon the heels of specific types of behavior. For example, there are certain rules for friendship—rules of fair play, of generosity, of respect for other people's wishes as well as for one's own—rules which can be broken only at the cost of loss of friendship. Thus, infringement on social law or rule, like infringement upon physical law, entails specific consequences. It is no good to say, "I am a law unto myself." No

one is a law unto himself. Adjustment to law and authority is absolutely necessary to sound mental health.

What a Desirable Attitude Toward Authority Is.—Each individual must learn what constitutes a desirable adjustment to authority, and the sooner a child begins his lessons in this type of learning, the better his adjustment will be. What is it, then, that he must learn? In order to achieve a sound adjustment to authority:

1. He must learn what constitutes a good and desirable authority: What kind of law it is wise to obey; what kind of superior wisdom and experience it is desirable to consult.

2. He must learn what constitutes a bad authority: What kind of opinion it is wise to disregard; what kind of advice is worthless or vicious.

3. He must learn self-discipline enough to comply with a good authority.

4. He must develop strength of will enough to resist a bad authority.

Real wisdom in judgment of authority and real courage in acting upon such judgment comes only as the result of practice. Children should, therefore, be encouraged to assume such responsibility as rapidly as they have achieved enough experience to make their judgments sound; they should be taught to weigh good advice, yet to value their own experiences for whatever those experiences may be worth. They should, in other words, learn to achieve that fine balance of adjustment to authority which means *compliance without weakness*.

AMBITION OF PARENTS FOR THEIR CHILDREN AS A FACTOR IN DETERMINING BEHAVIOR

The Parent Often Tends to Identify Himself With His Child.—Another relationship between parents and children which is extremely important to the development of the child is that of the ambition of parents for their children. Since self-preservation is a first law of life it seems natural that people should be more interested in themselves than in anyone or in anything else. The chief exception to this principle is the interest that parents have in their children, for children, being the first extension of their parents' egos, are often identified

with the most intimate thoughts and secret ambitions of those parents. This identification of parent with child, this refusal to grant the child an individual personality (ego) of his own is one of the greatest sins of selfishness. In its most generous form one sees self-effacing parents who make every sacrifice that their child may have possessions and privileges denied them in their own childhood. We hear these parents say, "Bob will never have to work as I had to," or "Betty is going to have all the good times I missed when I was a girl."

Protection of Children Should Still Permit Growth.—In so far as work and suffering are a detriment to growth, children should, of course, be protected from them. Abuses of children and the understanding that abuse is destructive to growth have led to child labor laws, children's protective agencies, and similar expressions of the desire to spare children undesirable hardships. We must not, however, lose sight of the fact that a certain amount of striving for achievement, of struggle for fulfillment is fundamental to rapid and desirable growth.* Overprotected children, like overindulged children, suffer a handicap for the very reason that they have been denied the opportunity for strength which struggle gives. Parents who deprive their children of struggle and discipline deprive those children of the very experiences which lent strength and meaning to their own lives. They fail also to realize that gifts too easily acquired cannot be appreciated for their full value, and hence these indulgent parents find themselves bewildered when their children attach little importance to the so-called "blessings showered upon them."

Parents Should Recognize That Children Differ From Themselves.—In its less generous form the identification of parent with child becomes a refusal to understand or tolerate the fact that children are not duplicates of parents—a refusal to grant the child any individuality in wishes and desires. Sometimes we hear a mother say, "Betty wants a bicycle for Christmas, but when I was her age I was just crazy for a doll. I've the most beautiful doll for her; I just know she'll love it." And Betty's disappointment on Christmas morning leaves the mother with only a bewildered self-hurt, but with no clearer

* Adler develops this thesis clearly in his *Individual Psychology*.²

understanding that Betty is not a duplicate of herself. One father who had always wanted to be a lawyer refused to permit his oldest son to study for medicine because "the young scoundrel doesn't know the thrill of arguing before a jury. Just wait until he's tried it; he'll be grateful to me for insisting." The father, denied expression of his own wish and intent upon molding a law career through his son, failed to see that he was denying his son the same expression of an equally strong wish. This desire of parents to live again through their child, to find in him the pleasures they missed, the satisfactions they failed to achieve, is an urge to make up through the child for the disappointments and failures of their own lives, and is detrimental to the development of the child.

Reflected Success.—Less specific than these urges to live the detail of joy or disappointment through the child is the general urge to find success through the child in no matter what form. In this case the parents do not force any specific career upon the child, but insist upon success wherever the child seems most likely to achieve it. Difficulty often rises here when parents, refusing to recognize mediocre or inferior ability in the child, drive him far beyond his natural ability. Many modern families who have never boasted a college graduate have come into enough financial prosperity to afford these four additional years of training. They insist that the son or daughter must go to college even though the child, either recognizing his academic limitations or finding his natural level of success in mechanics or business, begs to be spared. In many cases parents insist because college represents to them a generalized brand of success, if only an indication that father has succeeded well enough to afford four more nonearning years for each of his children. Thus we see the desire for glory and success in a reflected form. The parents live success if their child succeeds; they feel their own egos inflated when their child has achieved glory.

The urge of parents for the feeling of success through their child takes another form. If a child can recite an endless chain of nursery rhymes when he is two years old, or if he can graduate from high school at fourteen, thus persuading people to remark, "What a bright child!" parents can feel, "He is mine;

he inherited his brightness from me; therefore I am brilliant." Or, if he can be trained to perfect manners at a very early age, people can be encouraged to remark, "What a well-trained child. He must have very unusual parents," thus gratifying the parental ego directly. Such commercialization of the child for the sake of parents is usually entirely unconscious on the part of the parents, but it is unfortunate nevertheless.

We have also the abundantly successful parents who need to find no vicarious or compensatory success in their child, but who feel that they have a tradition to maintain. The father belongs to "a long line of doctors," the mother to "a long line of musicians," and so on. These parents, proud of their own success and of that of their forbears, can tolerate no let down in the family tradition. Regardless of individual capacity or interest, therefore, the child must carry on. Sometimes this "family tradition" is set by an older child who succeeds brilliantly in business or in music, so that a younger child, neither able nor interested in these lines but drawn toward another line of work, is regarded as disloyal if he fails to follow the pattern set.

The Urge for Success is Sometimes Dangerous.—Sayles¹²⁶ says, "A natural and inevitable accompaniment of normal parental love is the wish to see the child succeed." It is not the parental wish to see the child succeed that is dangerous; often the very wish for success and faith that it will come is the motive which produces it for the child. Trouble arises when the parental wish becomes selfish. When the major drive behind the wish is gratification of the parental ego or a desire to live again one's own life through the child parents rob the child of individuality, and force the development of interests that are not native or dwarf capacities that should be dominant.

Again, trouble results whenever parents refuse to accept inherent limitations and continue to drive beyond native ability. No amount of hard work can make up for serious native deficiencies. Nothing but failure can come to a child driven beyond reasonable effort. Whenever a child has made a serious effort the feeling that he has failed to meet the expectations of his parents is disastrous. Continued disappointment of parent in child produces a discouragement which inhibits even the

measure of success that would otherwise be possible. The child in school who does not even try because he is too discouraged or too terrified of failure is a familiar spectacle. One of the most brilliant women chemists in America has never found the happiness or self-assurance due her from her work because her father has never allowed her to forget that she failed him when she failed to become a musician.

The Effect of Praise or Blame is Important to Children.—

The whole subject of praise and blame is involved here. Too ready praise can breed habits of laziness and self-complacency. Lack of serious competition or lack of sufficiently high standards of accomplishment are almost sure to leave wells of capacity undeveloped. On the other hand, too constant blame can breed habits of failure and self-effacement. Too serious competition and too rigid standards are almost sure to blight development. Thorndike,¹⁵⁴ after extensive study in the psychology of learning has said, "Being told that a thing is right, is several times as effective in making one do the same thing at the next opportunity, as being told that a thing is wrong keeps one from doing that same thing at the next opportunity." In other words, comments on successes make learning proceed faster than do comments on errors; praise is more effective in teaching than is blame.

Myers,⁹⁹ too, has made clear that the method of teaching children by celebrating their successes has a great advantage over teaching by nagging about mistakes. This does not mean that pointing out mistakes is to be avoided in every instance, but means that the emphasis should be laid on the right learnings rather than on the wrong ones. The chief thing to be borne in mind in this connection is that parental ambition must be adjusted to the capacity and the interest of each individual child.

Standards should be high enough to exact maximum development of native capacity, but flexible enough to adjust to incapacity. Praise and blame should be awarded according to effort as well as according to product, and the concept of success should be broadened to include the achievement of a good disposition and of a desirable social viewpoint, and should not be limited to the attainment of material prosperity.

CASE STUDIES

Case I. Betty V.—Betty V. is a pale, unhealthy looking child of four, who illustrates the effect of unsteady discipline and of crowded housing conditions. Most of the time her expression is unhappy. She whines continually and is exasperatingly slow over the performance of all the routine duties. She is erratic in her behavior and variable in her attitudes toward adults as well as toward children. At times she is cooperative and willing to enter into activities; at times she cries and fusses. She will play quietly with a child, and then suddenly begin to whine or bully. She will throw her arms around a smaller child, help him in his work and stand up for him against the other children, and then forsake him or knock him down and snatch away his toys. She will play well with another little girl for a short time but after the novelty of a playmate wears off, she begins to get "bossy" and to demand the lead. She has tried to play with one little boy in particular, but she pesters him continually and, when he retaliates, she runs crying to a teacher. She has tried continually to make herself a member of the group but her method of attack is very unsatisfactory, for she tries to force herself in and she teases the other children. Her work is spasmodic, her concentration is poor, and she has little originality or initiative.

The home picture would lead one to expect a child of this type. The apartment is small, two bedrooms, a living room and a kitchen, all of the rooms opening from the living room. Betty sleeps in her parents' room, the extra bedroom being used for the father's home studio. She has very few toys—some dolls, a carriage, a toy victrola, and two or three books, but little that can be used for constructive play. She has her supper at half past seven and, after a romp with her father, is put to bed. As a result of the romp she takes a long time to get to sleep. She gets up at about eight in the morning, which means that since she arrives at school at quarter of nine there is always a rush to get her through her breakfast. On the whole her health régime is unsatisfactory.

Her father is an artist and is quite irregular about the time of his home coming. He is quiet with Betty but not consistent in his treatment, as he sometimes demands instant obedience and at other times laughs at her misbehavior. The mother nags the child continually but she rarely follows through on any command. She allows Betty to tease her for information but does not give definite or satisfactory answers to the child's questions. She complains when Betty gets in her way because she wishes to help her mother, but she does not provide any work that the child can do.

The relationship between Mr. and Mrs. V. seems quite satisfactory but he gives the impression of being the leader while she sits by in a placid way. The only demonstration of affection that was evident during a long visit in the home was shown between Betty and her father. Mrs. V. said, "Mr. V. and his family are very demonstrative and it is hard for me to act affectionate toward them. It is even hard for me to show affection to Betty. Her father's demonstrativeness toward her makes quite a contrast."

Betty seems to reflect this home atmosphere in her behavior. She uses the teasing, pestering method that she has found to be successful with her mother; she nags the other children as her mother nags her. She alternately caresses and scolds the younger children, the method her father uses with her. Her inability to adapt to a routine may probably be due to the lack of system in her home. Inadequate sleep and an unsatisfactory health régime account for a good deal of her behavior.

Case II. John M.—John M. presents a very different picture. He is a happy child when in the nursery school, and is full of interest in everything and everybody, but he runs about aimlessly and seems unable to concentrate on any activity for more than a fraction of a minute at a time. He is not, as yet, one of the group, being only two years old, but he is just reaching the age where playmates are beginning to mean something to him. He is entirely sure of everyone's affection and is exceedingly quick to take advantage of any adult he can win by acting in an "appealing" way. If one is in the midst of scolding he will smile, try the effect of a hug and let forth a perfect torrent of chattering talk, watching carefully for the result. He is, to a certain extent, spoiled. He begs adult aid in any difficulties with the children, cries at the slightest bump, asks for sympathy, and demands a great deal of adult attention. Most of the time he is happy and contented, but every once in a while when the day starts badly he is cross and fretful. He is often overtired, behaving like a thoroughly overstimulated child.

John's father and mother have been married for eleven years and he is the first and only child. His father is seldom at home as his business keeps him downtown late and he sees the child only on an occasional evening and over the week ends. His mother is small, of a characteristic "doll faced" prettiness, but one is amazed by the sound common sense and the amount of knowledge she displays in bringing up the child. In carrying out the principles of child training she has acquired, however, she has had to face two rather difficult obstacles. Mr. M. obeys John's slightest whim. If John asks father to undress and go to bed with him at half past seven, father does it. He cannot bear to punish John or cross him in any way and seems to have no conception of any attitude on the child's part beyond that of the present moment.

The second difficulty lies in the presence of the grandmother, Mrs. M.'s mother. She is overdemonstrative with the child, sympathizes with every difficulty—real or imagined—that comes into his life and allows herself to be completely guided by his wishes. She works during the day, getting home about quarter of seven. Having been away from John all day she encourages him to play and romp with her at night which gets him in an excited state just before bedtime. She takes John's part against his mother when he has been punished, either by actively showing her feelings or by concealing them badly. John is quite aware of his ability to enlist her cooperation and he takes every advantage of it when grandmother is there, but he is also quite well aware of the fact that when his mother says "No" she means it, and he plays quietly and contentedly by himself when they are alone. The father and grandmother constantly vie with each other for John's favor, bringing him numerous toys, sweetmeats, and so on when they return home at night. It is not at all unusual for each of them to appear the same evening bringing the same new nickname; so that John not only has an excessive number of toys, but has duplicates of many of them. Overstimulation and lack of concentration, both of which seem to threaten John's physical and personality growth, can easily be traced to such a home situation.

To the adults in the nursery school he reacts as he has learned to at home: he tries his cajoling method first—if that fails he manages by himself. If, on the other hand, it succeeds, he never forgets the particular association he has built up. In proportion as the constructive influence of the school and the mother can dominate the destructive influence of the father and the grandmother John will develop in self-control and consideration for others. Meanwhile there can be seen

already in his bursts of irritability the beginning of conflict which is inevitable when children are torn between different types of discipline.

Case III. Bob A.—Bob A. is a pale, wiry child of five. In the nursery school he is cooperative with adults, and is most willing to play with the children but is seldom sought by them as a companion. His mood is variable. Although he generally occupies himself with quiet concentration, he has streaks of "showing off" during which he rushes about madly, talks loudly, and sets up cries of "Dumbbell" and "You're garbage." He has a persistent habit of masturbation which he forgets occasionally when intensely interested in something else, but which often tempts him away from absorbing work or play. He has had one short period of nail biting.

Bob's father is a night watchman, married to a woman much better educated than himself. He once had ambitions to superior training but these were frustrated by the war, so that he has a keener feeling of inferiority than as if he had never had a desire for further education. He is full of the compensations of a man who feels himself a failure, being a brusque and blustering person with a bad temper which flashes out and leads him to explosions of bitterness and sarcasm. After the temper is over he refuses to refer to the episodes. Aside from these compensations, which are quite unconscious, he is a man without pretense, who talks quietly and naturally about his work or about anything else which happens to interest him. He is very fond and proud of Bob, talking a great deal about him and displaying his good points, but seems to lack utterly an understanding of the gentler type his son represents.

Bob's mother is a high-strung, sensitive woman who seems somewhat bewildered and rather more than somewhat discontented with her lot in life. In order to supplement the family income she teaches and is away from home almost all day. She has had a great deal of difficulty in adjusting to her husband's temper and feels keenly the lack of companionship she had always hoped marriage would mean. Her attitude toward Mr. A. is quite intolerant. Before other people she often corrects statements he makes and tells him that he cannot repeat information accurately. She also objects when he interferes with Bob at the table. She seems to resent his methods of discipline with Bob. Toward Bob she is all kindness and understanding. In contrast to the father's brusque manner toward Bob the mother's patience and gentleness are conspicuous. She worries about the child a good deal, however, being anxious because he is underweight and because she cannot get him to go to sleep quickly at night. She is disturbed about his masturbation and his bad language, but she is wise enough not to nag him about them.

There is a close relationship between the mother and child, who talks to her constantly while he seems unwilling to make any contacts with his father. However, it was interesting to note that when he is away from his parents, Bob's conversation centers entirely around his father and the things his father can do. Some of his bombastic behavior in the nursery school is doubtless an attempt to imitate his father's traits. He repeats many of his father's religious and racial prejudices in the same explosive wording he has heard his father use. At five years of age his attitude about these matters seems almost determined.

Bob's parents are devoted to him although they disagree about his upbringing. The most important factors in his environment—factors which readily explain his bad habits, and his other evidences of tension—are the irregular hours of his parents' work, the explosiveness of the father

and his lack of ability to understand Bob, the worrying of the mother, and the underlying current of disharmony between the husband and the wife which expresses itself in petulant nagging of the husband by the wife. Until harmony and tranquility can somehow be created in this home we cannot expect relief in Bob's behavior.

Case IV. Anna B.—Anna B. is twenty-nine months old. She is a delightful child, well built and physically robust. The daintiness of her clothing, the evident emphasis in the home placed on her routine and the constant attendance of her nurse lead one to describe her as "giving the impression of being rather too well cared for." She has a happy disposition and is quite willing to carry out the nursery school régime, but she reminds one distinctly of the "absent-minded professor." When started on some routine duty, work or play, she will attend for a few minutes and then wander off. As is usual at her age, she seldom plays with the other children, but unlike most children, she is rarely busily active about her solitary play.

Her father and mother are separated. Anna lives with her mother and a nurse. The apartment is small, but every effort has been made to give the child the proper physical environment. Her routine is worked out on schedule and is scrupulously carried out. She has quite a number of toys, most of which have been intelligently selected, but her chief interest has centered, and has been encouraged to center, around a victrola which she can now operate alone.

Her mother is in business but is usually at home when Anna returns from nursery school. The mother is a pleasant person and a good conversationalist; is called broad-minded by her friends and glories in the fact. She seems, in many ways, to be adolescent rather than adult in her outlook, a fact which probably explains her inability to achieve anything like real insight into Anna's most fundamental needs. She is extremely ambitious for Anna and wants her to have every cultural advantage. She seems to feel that travel will provide these advantages and so talks a great deal about her plans for travelling when Anna grows a little older. One can see in these plans, however, that the mother's fundamental aim is the pleasure of travel for herself, and that she is only using Anna as a means to an end. She knows very little about young children and seems incapable of putting herself in Anna's place to a degree that would provide by insight what she lacks in knowledge. As a result she fusses at Anna continually, and constantly directs her about being careful of her toys and her clothes, failing to realize that such young children cannot be as skillful as adults in management of objects and care of clothing. On the other hand, she encourages the nurse to wait upon Anna constantly.

Anna's home gives one the impression that it is overdirected, and that Anna suffers because of an overemphasis on physical hygiene at the expense of mental and social well-being. Too much care in the physical order of life by the nurse and too many commands from the mother have tended to produce babyish dependence. Too much conversation about the future and too little attention to companionship in the present have produced dreaminess and absentmindedness in the child. There is too little provision for independent expression; too much of a tendency for the mother to absorb the child's personality.

Case V. Barbara and Betty B.—Barbara and Betty B. are sisters four and one-half and three years old, who illustrate the need of impar-

tiality in dealing with children and the need of sound adjustment in the amount and kind of affection given. They are attractive though frail-looking children, both of whom were distinctly under par physically when they entered the nursery school. Both were lacking in initiative, dependent on adults, unable to meet children of their own ages successfully. Barbara was a particularly pathetic child. She rarely spoke; she never played with the other children. She sat at a table during work period, apparently devoid of ideas, staring into space or gazing about her, or stood about on the playground doing nothing. Efforts to draw her out or engage her interests if made by children met with no response, or if made by adults resulted in strong attachments to those adults. She would select some student or teacher for attention, would cling and follow her about, seeming to gain some feeling of security from the contact. If spoken to or asked to speak before the other children she seemed overpowered with shyness and quite wretched. In the course of a year she began to make an adjustment to the other children although she would still sometimes ask adults if other children liked her. She came at the end of two years to talk and laugh—even to indulge in silly streaks, although even after such long contact with the nursery school her silliness was often a self-conscious bid for attention. She became less dependent upon adult attention and less intense in her attachments, however, as her contacts with children became more satisfactory.

Betty, though lacking in initiative and independence, has never seemed to be as starved for attention nor as excessively self-conscious as Barbara. Although both children have had difficulty in meeting other children, they have always played together smoothly and seem very fond of each other. Barbara, timid and self-effacing before other children, dominates and often imposes upon Betty when they are together.

It was not easy upon investigation into the home to find there any tangible reasons for the excessive shyness, lack of adaptability, and almost complete lack of initiative of these children. Yet their history reveals much that is significant. Until Betty was a year old financial difficulties kept both mother and father at work, and the problem of caring for the children was solved by placing them with their maternal grandparents, thus separating them from their parents. Betty was the grandfather's favorite, and partly because of this, partly because she was the less sickly of the two children, she was played and romped with more than Barbara. The grandmother, too, was more attracted to Betty, and allowed herself to indulge in obvious partiality. Thus Barbara, for eighteen months the only child, was suddenly forced not only to share attention and affection, but to give them up almost entirely. Her lack of confidence in herself, her overaggressive behavior toward Betty, and her excessive bids for love are the natural result.

When Betty was a year old the parents had succeeded in establishing a home for the children, and the family, plus the grandparents, came to live together. The parents, naturally drawn in affection more to Betty than to Barbara, continued the practice of favoritism until it was pointed out to them that most of Barbara's disagreeable traits were probably traceable to that situation. They have made a conscientious effort to correct their attitude and practice, but the grandparents, particularly the grandfather, still fail to conceal their partiality. Mrs. B. whose love Barbara seems to crave most, still works, however, and being naturally an undemonstrative person, has neither the time nor the understanding necessary to meet the child's love needs.

Betty, on the other hand, has had too much protection and attention.

Her dependence and lack of adaptability are the result of too much petting and waiting on.

This case is interesting because it demonstrates that two children of the same sex, only eighteen months separated in age, can be brought up in the same home, yet live in widely different environments. Still more interesting is the fact that the picture of behavior is similar enough to deceive an off-hand observer into thinking that such similarity is in itself proof of similarity of environment. Yet, careful study of the situation shows that the two pictures of dependence, lack of adaptability, and lack of initiative are due to diametrically opposite features of the environment—the one to too little attention and affection, the other to too much.

Case VI. The Smith Family.—The Smith family is interesting as an illustration of the effect of constitution of the family upon the behavior of individuals within the family group.

Barbara, the oldest, was ten when the family first came to the clinic; she was beautiful, talented, successful. She led her class at school with ease, was socially a most effective and attractive person. She played the piano, sang, rode well, and was outstanding in several sports.

Doris, age eight, thrown constantly with Barbara, was the ugly duckling. She had straight, fine hair of an ordinary color, and dreamed of golden curls like Barbara's. Her eyes were badly crossed, making glasses a necessity, and her vision was so defective that she could not devote herself to school work in order to achieve the success for which her alert mind and her frustrated emotions hungered; nor could she pursue music, in which she gave real promise until the oculist forbade further work. Her self-consciousness and sense of frustration had conspired to produce a cross, petulant disposition, and to destroy grace of manner. She was awkward at the table where she often spilled things much to the disgust of the rest of the family. When summoned to meet a guest she was likely to stumble and bump into things. She was given to bursts of temper and fits of selfishness. In constant contrast with a sister who was beautiful, Doris was forced to try to convince herself that physical attractiveness was not important; so she endeavored to convince the world of the same thing by defiance: she was untidy, refused to bathe or to brush her hair. We can imagine her defiant attitude sometimes melting into a pitiful feeling of "what's the use." In this there appeared on the surface only an aggravating child, perverse, rebellious, sullen, stubborn—unwilling even to make the best of what she had.

Bob, age five, and the only boy, was a handsome youngster, possessed of the charming social manners common to all the family excepting Doris. He was, however, very high strung and a bad feeding problem. Being the only boy, and adored by his sisters, he was already convinced that his sex entitled him to certain privileges—the largest dish of ice cream, the right to choose where the family was to picnic, the front seat beside the driver, and above all, the right to "manly" behavior which, in less complimentary terms, would be referred to as temper tantrums. The father was largely responsible for this misinterpretation of what was "manly" and, hence, desirable behavior. He was convinced that "boys are different from girls"—should be expected to mind less well and to rebel more against authority. He thought that modern scientific findings in nutrition and in psychology were "all nonsense." Thus attempts on the part of the mother to correct Bob's behavior, especially his temper and his feeding habits, met with but persistent resistance from the father.

Elizabeth, age three, promised to reproduce the triumphs of Barbara.

In such a family the problems are not easy to solve. Bob, of course, can and should be taught the obligations of gallantry and the "manliness" of self-control. Doris' problem is more difficult. The mother, in an attempt to treat Doris as generously as she did Barbara, dressed Doris and Barbara exactly alike, thus unwittingly emphasizing the contrast between them. The ruffles and dainty colors which enhance Barbara's feminine beauty serve only to sharpen Doris' lack of it. The mother was open to suggestion, however, and dressed Doris in more tailored clothing which soon taught the child that she could be much more attractive as an individual type than as a pathetic copy of Barbara, and soon convinced her that tidiness and cleanliness were inherent aspects of her particular type. Success in school and in the social accomplishments of music and dancing may always be impossible for Doris, but the charm of a sweet disposition and of constant consideration for others has already come within her vision, and social grace waits only for sufficient beginnings in social success to put her at her ease. She can never be the thrilling source of pride that the other children are, but she understands now that she can win a sincere affection from all of the family if she wins a clear enough victory over herself.

SUGGESTED QUESTIONS

1. Observe some family in which there are young children (your own family if possible) and discuss the following attitudes of the older people (including older brothers and sisters) toward these young children:
 - (a) Amount and kind of praise and other types of discipline.
 - (b) Affection, jealousy, generosity, loyalty.
 - (c) Standards of work, play, mutually shared responsibilities.
2. What is the effect of all of this upon each child? How does each react? Why? Would a child of a different personality type react in the same way?
3. Why do you think the older members of the household have the attitudes they do have? What is good about their attitudes? What seems harmful? Is it possible (or wise) to attempt to change any of the apparently harmful attitudes?

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APPENDIX

TABLES OF HEIGHT AND WEIGHT

TABLE XIX

HEIGHT STANDING (INCHES) BOYS AND GIRLS BIRTH TO NINE MONTHS
(Federal Children's Bureau†)

Age (months).	Height.	
	Boys.	Girls.
Under 1 month	21.125	20.875
1 month, under 2	22.500	21.875
2 month, under 3	23.625	23.125
3 month, under 4	24.500	24.000
4 month, under 5	25.375	24.875
5 month, under 6	26.125	25.500
6 month, under 7	26.750	26.125
7 month, under 8	27.250	26.750
8 month, under 9	27.750	27.250
9 month, under 10	28.250	27.625

* Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

† Bureau Publication No. 84, Community Child Welfare Series No. 2. Fractions have been changed to decimals.

TABLE XX

WEIGHT (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS BIRTH
TO NINE MONTHS
(Federal Children's Bureau*)

Height (inches).	Weight.	
	Boys.	Girls.
20.00	8.250	8.125
20.25	8.312	8.406
20.50	8.375	8.6875
20.75	8.417	8.969
21.00	9.500	9.250
21.25	9.750	9.562
21.50	10.000	9.875
21.75	10.250	10.187
22.00	10.500	10.500
22.25	10.875	10.844
22.50	11.250	11.1875
22.75	11.625	11.531
23.00	12.000	11.875
23.25	12.375	12.250
23.50	12.750	12.675
23.75	13.125	13.050
24.00	13.500	13.375
24.25	13.875	13.750
24.50	14.250	14.125
24.75	14.625	14.500
25.00	15.000	14.875
25.25	15.406	15.250
25.50	15.8125	15.625
25.75	16.218	16.000
26.00	16.625	16.375
26.25	16.969	16.687
26.50	17.312	17.000
26.75	17.656	17.312
27.00	18.000	17.625
27.25	18.343	17.969
27.50	18.687	18.312
27.75	19.031	18.656
28.00	19.375	19.000
28.25	19.687	19.312

* Bureau Publication No. 84, Community Child Welfare Series
No. 2.

TABLE XXI*

HEIGHT STANDING (INCHES) BOYS AND GIRLS NINE TO EIGHTEEN MONTHS

(Federal Children's Bureau†)

Age (months).	Height.	
	Boys.	Girls.
9 months, under 10.....	28.250	27.625
10 months, under 11.....	28.625	28.125
11 months, under 12.....	29.000	28.500
12 months, under 13.....	29.500	28.875
13 months, under 14.....	29.875	29.250
14 months, under 15.....	30.250	29.750
15 months, under 16.....	30.625	30.125
16 months, under 17.....	31.000	30.500
17 months, under 18.....	31.375	30.875
18 months, under 19.....	31.750	31.250

* Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

† Bureau Publication No. 84, Community Child Welfare Series No. 2. Fractions have changed to decimals.

TABLE XXII

WEIGHT* (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS NINE
TO EIGHTEEN MONTHS
(Federal Children's Bureau)

Height (inches).	Weight.	
	Boys.	Girls.
28.25	19.687	19.312
28.50	20.000	19.625
28.75	20.312	19.937
29.00	20.625	20.250
29.25	20.969	20.500
29.50	21.312	20.750
29.75	21.656	21.000
30.00	22.000	21.250
30.25	22.312	21.344
30.50	22.625	21.437
30.75	22.937	21.531
31.00	23.250	22.625
31.25	23.562	22.807
31.50	23.875	23.187
31.75	24.187	23.469
32.00	24.500	23.750

* Weight for height fraction of whole number, such as 20.25 etc.
obtained by calculation.

TABLE XXIII

HEIGHT STANDING (INCHES) FOR MERRILL-PALMER NURSERY SCHOOL
BOYS AND GIRLS TWENTY-FOUR TO THIRTY-SIX MONTHS

Age in months.	No. of cases.	Average (50 percentile) height, boys.	No. of cases.	Average (50 percentile) height, girls.
†24	29	34.6	27	34.2
25	..	34.9	..	34.4
26	..	35.2	..	34.7
27	..	35.4	..	34.9
28	..	35.7	..	35.2
29	..	35.9	..	35.4
†30	48	36.2	44	35.7
31	..	36.4	..	35.9
†32	56	36.7	49	36.1
33	..	36.9	..	36.3
34	..	37.2	..	36.6
35	..	37.4	..	36.8
36	..	37.6	..	37.1

† The number of cases is reported only at these months because the standards were calculated for six-month age groups in which 24, 30, and 32 were the mid-points; the values at the remaining month levels were interpolated between these values.

TABLE XXIV

WEIGHT (POUNDS) FOR HEIGHT (INCHES) OF MERRILL-PALMER
NURSERY SCHOOL BOYS AND GIRLS FROM 34 TO 38 INCHES

Height (inches).	No. of cases.	Weight, boys.	No. of cases.	Weight, girls.
*34	28	28.0	30	27.6
34.25	..	28.4	..	28.0
34.50	..	28.7	..	28.3
34.75	..	29.1	..	28.6
*35	35	29.5	46	29.0
35.25	..	29.8	..	29.2
35.50	..	30.1	..	29.4
35.75	..	30.4	..	29.7
36	..	30.7	..	29.9
36.25	..	31.0	..	30.1
36.50	..	31.3	..	30.3
36.75	..	31.6	..	30.5
*37	63	31.9	61	30.8
37.25	..	32.2	..	31.2
37.50	..	32.6	..	31.6
37.75	..	33.0	..	32.0
38	..	33.4	..	32.5

* The number of cases is reported only at these height levels because the standards were calculated for weight in which 34, 35, and 37 inches were the mid-points; the values at the remaining height levels were interpolated between these values.

TABLE XXV*

HEIGHT STANDING (INCHES) BOYS AND GIRLS EIGHTEEN TO THIRTY-
SIX MONTHS
(Federal Children's Bureau†)

Age (months).	Height.‡	
	Boys.	Girls.
18 months, under 19.....	31.750	31.250
19 months, under 20.....	32.125	31.625
20 months, under 21.....	32.500	31.875
21 months, under 22.....	32.75	32.250
22 months, under 23.....	33.00	32.500
23 months, under 24.....	33.375	32.750
24 months, under 25.....	33.625	33.125
25 months, under 26.....	33.875	33.375
26 months, under 27.....	34.125	33.625
27 months, under 28.....	34.375	34.000
28 months, under 29.....	34.750	34.250
29 months, under 30.....	35.000	34.500
30 months, under 31.....	35.250	34.875
31 months, under 32.....	35.500	35.125
32 months, under 33.....	35.750	35.375
33 months, under 34.....	36.000	35.625
34 months, under 35.....	36.250	35.750
35 months, under 36.....	36.500	36.000
36 months, under 37.....	36.625	36.250

* Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

† Bureau Publication No. 84, Community Child Welfare Series No. 2.

‡ Fractions have been converted into decimals for purposes of comparison.

TABLE XXVI

WEIGHT (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS EIGHTEEN
TO THIRTY-SIX MONTHS
(Federal Children's Bureau)

Height (inches).	Weight.*	
	Boys.	Girls.
31.75	24.187	23.468
32.00	24.500	23.750
32.25	24.562	24.062
32.50	24.625	24.375
32.75	24.687	24.687
33.00	25.750	25.000
33.25	26.093	25.344
33.50	26.437	25.687
33.75	26.781	26.031
34.00	27.125	26.375
34.25	27.437	26.719
34.50	27.750	27.062
34.75	28.062	27.406
35.00	28.375	27.750
35.25	28.719	28.094
35.50	29.062	28.437
35.75	29.406	28.781
36.00	29.750	29.125
36.25	30.094	29.437
36.50	30.437	29.750
36.75	30.786	30.062
37.00	31.125	30.375
37.25	31.469	30.720
37.50	31.912	31.062
37.75	32.156	31.406
38.00	32.500	31.750

* Weight for heights fraction of whole number, such as 34.25 etc., obtained by calculation.

TABLE XXVII

HEIGHT STANDING (INCHES) FOR MERRILL-PALMER NURSERY SCHOOL
BOYS AND GIRLS THIRTY-SIX TO SIXTY MONTHS

Age in months.	No. of cases.	Average 50 percentile height boys.	No. of cases.	Average 50 percentile height girls.
36	..	37.6	..	37.1
37	..	37.9	..	37.4
*38	65	38.1	58	37.6
39	..	38.3	..	37.9
40	..	38.5	..	38.2
41	..	38.7	..	38.5
42	..	38.9	..	38.8
43	..	39.1	..	39.1
*44	74	39.3	74	39.4
45	..	39.6	..	39.6
46	..	39.9	..	39.8
47	..	40.1	..	40.0
48	..	40.4	..	40.2
49	..	40.6	..	40.4
*50	70	40.9	73	40.6
51	..	41.1	..	40.8
52	..	41.3	..	41.0
53	..	41.6	..	41.2
54	..	41.8	..	41.4
55	..	42.0	..	41.6
*56	59	42.2	56	41.8
57	..	42.4	..	42.0
58	..	42.6	..	42.2
59	..	42.7	..	42.3
*60	41	42.9	36	42.5

*The number of cases is reported only at these months because the standards were calculated for six-month age groups in which 38, 44, 50, 56 and 60 were the mid-points; the values at the remaining month levels were interpolated between these values.

TABLE XXVIII

WEIGHT (POUNDS) FOR HEIGHT (INCHES) OF MERRILL-PALMER
NURSERY SCHOOL BOYS AND GIRLS

Height (inches).	No. of cases.	Average weight boys.	No. of cases.	Average weight girls.
*37.00	63	31.9	61	30.8
37.25	..	32.2	..	31.2
37.50	..	32.6	..	31.6
37.75	..	33.0	..	32.0
38.00	..	33.4	..	32.5
38.25	..	33.8	..	32.9
38.50	..	34.2	..	33.3
38.75	..	34.6	..	33.8
*39.00	75	35.0	64	34.2
39.25	..	35.3	..	34.6
39.50	..	35.6	..	35.0
39.75	..	36.0	..	35.3
40.00	..	36.3	..	35.7
40.25	..	36.7	..	36.1
40.50	..	37.0	..	36.5
40.75	..	37.4	..	36.8
*41.00	69	37.7	68	37.2
41.25	..	38.1	..	37.6
41.50	..	38.4	..	38.0
41.75	..	38.7	..	38.4
42.00	..	39.1	..	38.8
42.25	..	39.4	..	39.2
42.50	..	39.7	..	39.6
42.75	..	40.1	..	40.0
*43.00	53	40.4	44	40.4
43.25	..	40.8	..	41.0
43.50	..	41.3	..	41.6
43.75	..	41.8	..	42.2
*44.00	29	42.2	25	42.7

*The number of cases is reported only at these height levels because the standards were calculated for two-inch height groups in which 37, 39, 41, 43 and 44 were the mid-points; the values at the remaining month levels were interpolated between these values.

TABLE XXIX*

HEIGHT STANDING (INCHES) BOYS AND GIRLS THIRTY-SIX TO SIXTY MONTHS

(Federal Children's Bureau)†

Age (months).	Height.	
	Boys.	Girls.
36 months, under 37.....	36.625	36.250
37 months, under 38.....	36.875	36.500
38 months, under 39.....	37.125	36.750
39 months, under 40.....	37.375	37.000
40 months, under 41.....	37.625	37.250
41 months, under 42.....	37.875	37.500
42 months, under 43.....	38.125	37.750
43 months, under 44.....	38.250	38.000
44 months, under 45.....	38.500	38.125
45 months, under 46.....	38.750	38.375
46 months, under 47.....	39.000	38.500
47 months, under 48.....	39.125	38.750
48 months, under 49.....	39.250	38.875
49 months, under 50.....	39.500	39.125
50 months, under 51.....	39.625	39.250
51 months, under 52.....	39.875	39.500
52 months, under 53.....	40.000	39.750
53 months, under 54.....	40.250	40.000
54 months, under 55.....	40.500	40.250
55 months, under 56.....	40.625	40.375
56 months, under 57.....	40.875	40.625
57 months, under 58.....	41.125	40.875
58 months, under 59.....	41.250	41.000
59 months, under 60.....	41.500	41.250
60 months, under 61.....	41.625	41.375

* Based upon measurements of 167,024 white children with no serious defects, weighed and measured without clothing. The children included in the tabulation were 70 per cent of native parentage; 6 per cent with one parent native—one foreign born; 4 per cent of British and Irish parentage; and the remainder of Scandinavian, Italian, and other racial stock.

† Bureau Publication No. 84, Community Child Welfare Series No. 2. Fractions have been converted into decimals.

TABLE XXX

WEIGHT* (POUNDS) FOR HEIGHT (INCHES) BOYS AND GIRLS THIRTY-
SIX TO SIXTY MONTHS
(Federal Children's Bureau)

Height (inches).	Weight.	
	Boys.	Girls.
36.	29.75	29.125
36.25	30.281	29.437
36.50	30.812	29.750
36.75	30.969	30.062
37.	31.125	30.375
37.25	31.469	30.719
37.50	31.812	31.062
37.75	32.156	31.416
38.	32.500	31.750
38.25	32.744	32.062
38.50	33.187	32.375
38.75	33.531	32.687
39.	33.875	33.000
39.25	34.219	33.375
39.50	34.562	33.750
39.75	34.916	34.125
40.	35.250	34.500
40.25	35.656	34.875
40.50	36.062	35.250
40.75	36.469	35.625
41.	36.875	36.000
41.25	37.250	36.375
41.50	37.625	36.750
41.75	38.000	37.125
42.	38.375	37.500

* Weight for heights fraction of whole number, such as 36.25 etc. obtained by calculation.

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